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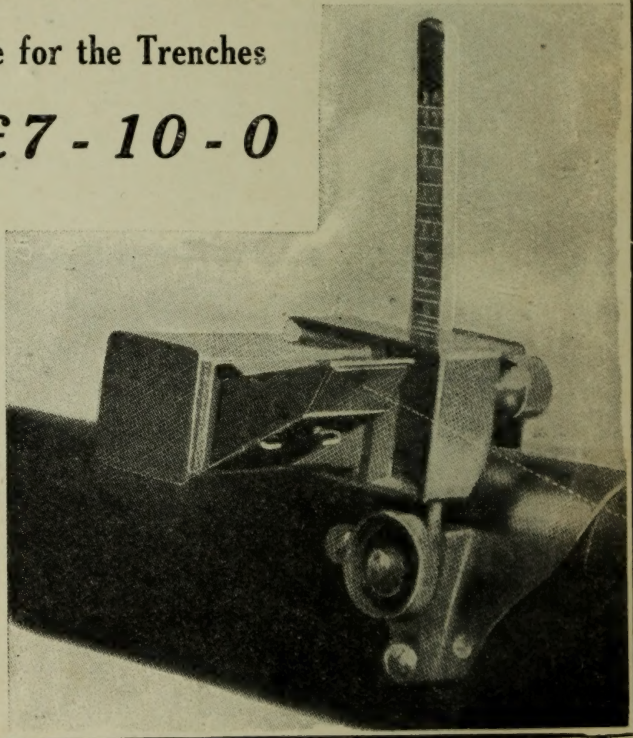

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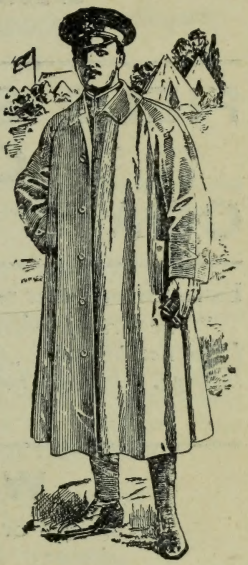

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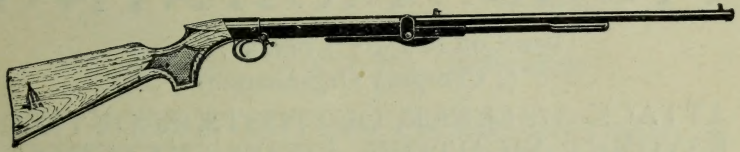

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Written by an Officer of the Regular Army

AND EDITED BY

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LONDON

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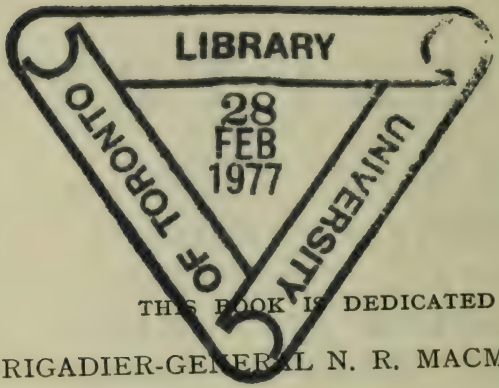

THIS BOOK IS DEDICATED TO

BRIGADIER-GENERAL N. R. MACMAHON, D.S.O.

KILLED IN ACTION, FLANDERS,

November 11, 1914.

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First Edition . . *January*, 1915
Reprinted . . *February*, 1915

EDITOR'S NOTE

Object of the Book.—This book is intended to serve as an introduction to *Musketry Regulations*. The instruction contained in it is consistent in principle and method with that laid down in *Musketry Regulations, Infantry Training* (1914), and other official manuals. It is hoped that the book may prove useful to officers and men of the newly raised units of the Regular Army, Territorial Force, and the Military Forces of the Dominions. As great care has been taken to explain the correct methods of carrying out musketry training, it is also hoped that it may prove useful to the Volunteer Training Corps, Officers' Training Corps, and Cadet Corps. The Preface contains notes on experience gained at the front in the present campaign, signed by General Sir O'Moore Creagh, V.C., which will prove of great value to officers in training their commands.

Scope of Instruction.—The scope of instruction in the book is practically identical with that laid down in *Musketry Regulations*. It contains the conditions of the individual and collective field practices recently laid down for the training of the new armies on classification ranges. It also includes directions for carrying out a complete course of musketry instruction on miniature ranges with the aid of the Standard Target Equipment adopted for this purpose.* This instruction includes elementary training, and leads up by progressive stages to visual training, fire discipline, fire direction and control, and a variety of individual and collective field practices which can be fired under conditions approximating as closely as possible to those of service.

Acknowledgment.—The Editor desires to express his thanks and acknowledgments to the Military Authorities and to His Majesty's Stationery Office for permission to reproduce illustrations and extracts from the *Musketry Regulations* and other official manuals. It is intended to keep each edition of this book abreast of the latest developments in the science with which it deals, and the changes made from time to time in the official training manuals.

LONDON, 1915. E. JOHN SOLANO.

* See Appendix, VII.

PREFACE

NOTES ON EXPERIENCE GAINED AT THE FRONT

By General Sir O'Moore Creagh, V.C.

1. The experience gained at the front in the present campaign may be divided broadly under two heads: Firstly, the test under war conditions of the general principles upon which the British Army has been trained in peace. Secondly, knowledge concerning the tactics of the enemy and his method of employing various arms. With regard to the former of these two heads of information, it is important to note *that the broad principles upon which the training of the British Army has been based are described by a General Officer as being sound, and that the need of paying strict attention to them in carrying out training is emphasized by him.* On the other hand, valuable experience has been gained as to the best method of applying these general principles to the peculiar conditions which have so far prevailed in the present campaign, including the tactics adopted by the enemy. Information based on this experience, more especially so far as it concerns the employment of musketry in attack and defence, is included in these notes, as it may prove useful to officers in training their commands.

2. These notes, therefore, do not affect the general principles of training laid down in this book. *They merely deal with the application of these principles to the peculiar conditions which have so far obtained in the course of the campaign.* These conditions may at any time give place to others, for it must be remembered that in no two military operations is the situation exactly the same. *Instructors, therefore, must avoid the mistake of training their men for*

any particular given conditions of warfare, and remember that general principles and broad rules alone are applicable to the leading of troops in war (*Infantry Training*, 1914).

3. German Musketry.*—(i) The Germans consider it unnecessary to teach men to fire at distances beyond 400 metres. Their plan of infantry attack (see diagram, p. ix) is devised to get within this range without opening fire. Accordingly, judging distance is practised by officers only, and no attention is devoted to the indication of targets, concentration of fire, or to fire direction and control generally, as practised in the British Army. To concentrate the fire of a platoon or company on one spot at 1,000 yards range was considered by Germans to be a waste of ammunition. Their training seems to have been limited to independent firing by battalions on large areas of ground.

(ii) Only some of their men were practised in rapid firing, which averaged eight or nine rounds a minute, as against the fifteen well-aimed shots a minute which British troops are trained to deliver in rapid firing. In this respect it may be mentioned that the straight bolt of the German rifle is not so easy to work as the bolt of the British rifle, nor is its clip so easy to put in. When put to the test of war, the musketry of the German infantry is characterized by British officers as poor and "lamentable."

4. British Musketry.—On the other hand, the German officer referred to in the footnote below described British musketry under the test of war as "marvellous," and, in doing so, expressed the views generally held in the German Army as the result of experience. He states that the Germans had

* These paragraphs contain information given by a captured German officer who speaks with authority in regard both to musketry and machine guns. His statements appear to represent the views held in the German Army before the war, on which the training of the German soldier has been based.

counted on being able to rush the British troops by weight of numbers by the plan of attack described in the next paragraph; but they found themselves unable to do so because the British rifle fire was " so straight and so quick." He added that " they had never had a chance against the British," because, although they reckoned on their third line with their machine-guns being able to get within 400 yards of the enemy, they had never been able to do this over open ground against the British, because their first line was down too soon—sometimes at 800 to 1,000 yards. Again, on the Aisne, this German officer's machine-gun battery came under the concentrated fire of British infantry at 1,000 yards, and though his men suffered heavily from it, they were unable to reply to the British, as they were unable to see them.

5. A German Plan of Infantry Attack.—(i) The diagram on page ix gives a rough idea of a German plan of infantry attack in close formations, as explained by a German officer. The first line is looked on as cover from bullets for the second and third lines, to enable these two lines to get close to the enemy with the minimum of loss. The Germans considered massed formations to be the only way to get up close to the enemy. Both ranks of each line in these formations are close together. When their third line is stopped, they have standing orders to dig in at once, and for this purpose the third line carries shovels and small picks. It has already been explained that, owing to the tremendous effect of British musketry fire, this German plan of attack has repeatedly failed after very heavy loss has been incurred.

(ii) As regards fire effect, the Germans had considered the machine-gun to be the most valuable method of discharging bullets, and an enormous amount of time, trouble, and

ammunition has been expended on machine-gun training, as well as upon their artillery, upon which they relied largely in their plan of attack. Notes referring to German machine-guns will be found in *Machine-Gun Training* of this series.

6. German Night Attacks.—(i) The enemy's night attacks are made without scouts or advanced parties, and the advance is made with great rapidity. Infantry in trenches

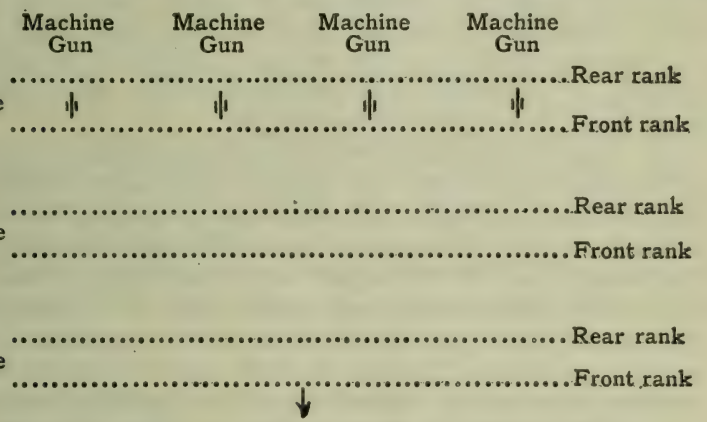

DIAGRAM SHOWING A GERMAN PLAN OF INFANTRY ATTACK IN CLOSE FORMATIONS.

must always be ready to open a burst of rapid fire at a few seconds' notice; so long as this can be done, there will be no chance of a trench being rushed. Supports should be in the cover-trenches, and, when the firing-line is attacked, should not fire, but rely on the bayonet.

(ii) The Germans usually attack about 3 p.m. (winter) or at dusk, and then entrench during the night within 200 yards of our lines. They also take advantage of fog in the early morning. They make a little progress in this way, but it

is slow work, and they have lost enormously, as already stated. They shoot badly with the rifle, and the effect of their fire is chiefly obtained by artillery and machine-guns.

7. Flares to illuminate Foreground at Night.—(i) No fixed apparatus can be set in the field for the reliable lighting of foreground at night which will survive a prolonged bombardment and bad weather, or admit of renewal or attention in the close presence of the enemy. This does not apply to electric searchlights employed in carefully chosen and protected sites in connection with harbour and fortress defences, nor to flares or bonfires set for the purpose of providing a single illumination for a given purpose, such as a signal or landmark.

(ii) For the temporary illumination of foreground during an engagement with the enemy, the best method is to employ hand and rifle "illumination grenades," which ignite on impact with the ground upon the same principle as in the detonation of the explosive or fighting grenades. By this means temporary illumination can be concentrated at the exact points at which it is most required. In siege warfare or trench fighting at close quarters there is special use for a combined incendiary and illumination bomb or grenade fired from a trench mortar. These bombs would be charged with inflammable material and liquid, such as cotton waste in petrol, together with a small charge of explosive,which would ignite and scatter the contents freely upon impact.

8. British Infantry Formations in Attack—(i) **Advance under Rifle or Machine-Gun Fire.**—Small columns in what are known as "artillery formations" should never be adhered to when there is a possibility of their coming under close or medium range fire of infantry or machine-guns. Troops have suffered severely from insufficient extension, and the adoption of rigid lines, and also from pushing forward in

close formations without taking the proper military precautions. Loose elastic formations adapted to the ground, with men at eight or ten paces interval, are the least vulnerable.

(ii) **Advance under Artillery Fire.**—Several times it has been necessary to advance under unsubdued artillery fire. Small columns at 50 yards' interval and 300 yards' distance have been found to be the best method of avoiding casualties. The 19th Brigade lying in the open in this formation were shelled by two batteries for half an hour, and had only twenty-five casualties.

9. Cover and Fields of Fire.—(i) Owing to the effect of German artillery fire, cover from view has become more important than field of fire. It is better to have a field of fire of 100 yards and to be invisible than to have one of 600 yards and be an easy target for artillery. Owing to the enemy's artillery fire by day, digging is nearly always done at night, and this requires much practice. Some sort of rough cover from shrapnel and head cover is made if time allows, and also if it can be made without making the trench conspicuous.

(ii) **Defensive Positions and Sites of Trenches.**—Whenever possible, trenches should be sited so that they are not under artillery observation. This point is regarded as of great importance, and an extensive field of fire is a secondary consideration. Trenches should therefore be sited having regard to possible observation stations on ground occupied by the enemy, and not solely with regard to the possible artillery positions of the enemy. In open country it is better to select a "back position," behind the crest of a hill, with a field of fire of 300 or 400 yards. This compels the enemy to expose his infantry to rifle and shrapnel fire, and affords his artillery little opportunity of observation. Such positions were held on the Aisne, with slight loss to our troops and heavy loss

to the enemy. A field of fire of 100 yards is regarded as satisfactory if it cannot be increased without loss of concealment from artillery observation.

10. Care of Rifles.—(i) The following directions are issued with regard to the care of rifles on service. New rifles are inclined to work somewhat stiffly at first, owing to slight roughness of the bearing surfaces of the bolt and bolt-way. This can be appreciably lessened by frequent and systematic manipulation of the bolt, the bearing surfaces being well oiled. Primary extraction—the first loosening of the fired cartridge in the chamber—can be improved by placing a fired case in the chamber, and working the bolt-lever up and down without drawing back the bolt.

(ii) Rifles must be kept clean and well oiled, and it has been found necessary to make an inspection daily or even oftener. Particular care must be taken to see that the chamber is scrupulously clean. If it is permitted to become dirty, great difficulty in extraction is likely to be experienced. It has also been found that cartridges get rusted into their clips, and that they should be moved at least weekly. Magazine springs may also become weak, if the magazine is continually kept loaded with ten instead of five rounds.

11. Conclusion.—(i) Up to the present the tactics of the enemy and the conditions of warfare of the campaign on the Continent have resulted as a rule in giving the infantryman fairly short fields of fire and more or less visible targets. This has accentuated the value of rapid, accurate fire within close range, to which particular attention should be paid in training men. On the other hand, when opportunity has afforded, the value of fire direction and control has been demonstrated by the effect of British rifle fire beyond close range.

(ii) The principles of training laid down in the *Musketry Regulations* and in this book as a whole should, therefore, be adhered to and carried out systematically. Above all, the sound principles that troops should be trained to make the best possible use of their weapons, not only at one but at all ranges of the battlefield, and that they should be trained to adapt their instruction to a variety of conditions, and not to any given conditions, should be observed faithfully. The correct application of general principles to the ever-varying circumstances of warfare should be the object of any sound system of military training.

(iii) The following subjects of training may be mentioned as being especially important in relation to the present campaign:

1. Rapid fire.
2. Entrenching, especially in the dark.
3. Cover from view of artillery for the trenches.
4. Bringing enfilade fire to bear on enemy's trenches whenever possible.
5. Skilful use of machine-guns. Infantry must be careful when advancing that an enemy's machine-gun is not hidden on the flank ready to open enfilade fire. Some regiments have lost very heavily from being caught in this way.

O'M. CREAGH.

LONDON, 1915.

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DEFINITIONS OF TECHNICAL TERMS AND MILITARY VOCABULARY

I. DEFINITIONS.

Aiming-Off.—Altering the point of aim laterally, so as to give deflection to the rifle-barrel without using the wind-gauge.

Aiming-Point.—The point in any target at which aim is taken, forming the extremity of the line of sight.

Aiming Up and Down.—Altering the point of aim vertically so as to give more or less elevation to the rifle-barrel without altering the sight.

Angle of Descent.—Angle at which the bullet falls to the ground at the end of its flight (Figs. 4 and 5).

Application.—An elementary musketry practice, designed to illustrate methods of correcting aim or sighting in accordance with observation or signals from the butts.

Approximation of Scoring Rings.—Concentric rings marked on an instructional target and possessing various values which afford a simple means of comparing the shooting errors of individuals, but having no relation to the vulnerable surfaces of the ordinary service targets.

Axis of the Barrel.—The axis of the barrel is an imaginary line following the centre of the bore from breech to muzzle (Fig. 2).

Beaten Zone.—Area of ground beaten by a cone of fire (Fig. 6).

Bull's-Eye.—A circular aiming-mark of varying size used in elementary training for grouping practice, with the object of eliminating all sources of error other than that of bad holding.

Concentration of Fire.—The directing of fire on one particular portion of the enemy's line. Its value lies in the demoralizing effect it produces owing to the heavy loss it inflicts at the point at which it is directed (Fig. 48).

Covered Approach.—Ground and natural or artificial cover which screens movement towards an objective from the enemy's view.

Culminating Point.—The culminating point is the greatest height above the line of sight to which the bullet rises in its flight; this is reached at a point a little beyond half the distance to which the bullet travels.

Dangerous Space.—The dangerous space for any particular range is the distance between the first catch and the first graze (Fig. 4).

Dead Ground.—Any ground on which troops cannot be struck by missiles fired by defenders of a position owing to the formation of the intervening ground (Fig. 10).

Deflection.—The inclination of the rifle-barrel laterally with reference to the line of sight, counteracting the effect of wind, drift, or other influence which tends to force the bullet out of a straight path.

Description Points.—Ground and its natural or artificial features used for indication of targets (Figs. 49-51).

Distribution of Fire.—The method of directing fire so that it may be scattered over several objects (Fig. 48).

Elevation.—The inclination of the rifle-barrel vertically with reference to the line of sight, necessitated by the downward influence exercised on the bullet by the force of gravity.

Error of the Day.—A term used to include errors in shooting due to miscalculation of atmospheric influences, such as wind, temperature, etc.

Error of the Rifle.—Any error inherent in a rifle, independent of any error due to the want of skill of the firer.

Fire, Kinds of—

Collective Fire.—The fire of several rifles combined for a definite purpose under the orders of a fire-leader. Such fire skilfully directed and well controlled may produce good effect up to 1,400 yards.

Converging Fire.—Fire aimed at one target from different points.

Covering Fire.—Fire delivered from the rear or flank by a special body of troops to keep down the fire of the attacked during the advance of the attacking body. It also includes fire delivered by portions of a line with a view to assisting the advance of the remainder (Fig. 48).

Effective Fire.—Fire which has the desired result upon the target.

Enfilade Fire.—Fire which sweeps a line of troops or defences from a flank (Fig. 48).

Frontal Fire.—Fire which is delivered directly to the front.

Grazing Fire.—When the angle of the fall of the bullets (see Trajectory) is the same as the slope of the ground and the missiles sweep along its surface the fire is called grazing (Fig. 9).

Individual Fire.—Fire opened without orders from a fire-leader. On account of the difficulty of observation 600 yards may be taken as the limit of effective fire of this nature against small targets.

Fire, Kinds of—*continued*

Indirect Fire.—Indirect fire is fire directed by means of auxiliary aiming-marks at an objective which is invisible to the firer (Fig. 48).

Masked Fire.—Troops (guns or rifles) in a position whence they could employ fire effectively against an enemy, but for the fear of causing casualties to their comrades, are said to have their fire masked by these latter troops.

Oblique Fire.—Fire directed on a target in a slanting direction —*i.e.* not directly to the front (Fig. 48).

Rapid Fire.—Fire delivered as quickly as the nature of the rifle admits.

Reverse Fire.—Fire so directed that the bullets strike the target in rear (Fig. 48).

Searching Fire.—Searching is the term applied to collective fire when the depth of its dispersion over a beaten zone is increased by the use of combined sights (Fig. 7).

Sweeping Fire.—Sweeping fire is fire distributed laterally (Fig. 48).

Unaimed Fire.—Unaimed fire is fire directed at a visible objective which strikes another objective to the rear of it (Fig. 48).

Fire Control.—Fire control is the duty of junior officers and non-commissioned officers, and consists in giving ranges to and pointing out targets to the fire-units, and seeing that their men adjust their sights to the range given. It further consists in regulating the volume of fire, the accurate passing of all orders and information, and in the cavalry and infantry the collecting of ammunition from casualties and its redistribution.

Fire Discipline.—The training of men so that they will instinctively carry out all orders of fire-unit commanders, and in the absence of orders adjust their sights and fire with due regard to the tactical situation.

Fire Effect.—The effect on the target resulting from the fire aimed at it.

Fire Fight.—The struggle for fire superiority.

Fire Position.—Positions from which fire is opened during the advance of an attacking force ; during the early stages of the advance with a view to gaining ground, in the latter stages with a view to gaining a superiority of fire.

Fire-Unit.—A unit, the fire of which is controlled by one commander. The normal cavalry and infantry fire-unit is the troop and section respectively.

Firing-Line.—In extended formations the line of troops from which the main body of fire is delivered.

Firing-Position.—The position, standing, kneeling, lying, etc., adopted for firing, according to circumstances.

First Catch.—The first catch is that point where the bullet has descended sufficiently to strike the head of a man, whether mounted, standing, kneeling, lying, etc. (Fig. 4, A).

First Graze.—The first graze is the point where the bullet, if not interfered with, will first strike the ground (Fig. 4, B).

Group, Grouping, or Diagram of Group.—The pattern made on a vertical target by a series of shots fired by an individual or the pattern made on a horizontal surface by concentrated collective fire.

Grouping.—An elementary musketry practice designed to test and standardize holding and the accuracy of rifles, and to expose constant errors in aiming.

Holding.—The form of skill required in order to press the trigger without disturbing the aim.

Inclined Sights.—A common fault in aiming—failure to keep the sights upright.

Line of Departure.—The line of departure is the direction of the bullet on leaving the muzzle—*i.e.*, the prolongation of the axis of the barrel (Fig. 2).

Line of Fire.—The line of fire is a line joining the muzzle of the rifle and the target (Fig. 2).

Line of Sight.—The line of sight is a straight line passing through the sights and the point aimed at (Fig. 2).

Marking Down.—Noting the exact position of an enemy seen to occupy ground or cover.

Mutual Support.—The fire of one unit directed at the enemy to cover and assist the movement of another unit (Fig. 48). Also individual soldiers working in pairs to assist each other in firing.

Observation.—Watching the effect of fire on the target with a view to correction or verification of sighting, either by watching for the dust thrown up by bullets or the behaviour of the enemy.

Permissible Error.—Error made in estimating range which does not render fire ineffective.

Ranges, Terms applied to.

Terms applied to Ranges.	Rifle.	Field Artillery.	Heavy Batteries.
	Yards.	Yards.	Yards.
Distant	2,800 to 2,000	6,500 to 5,000	10,000 to 6,500
Long	2,000 to 1,400	5,000 to 4,000	6,500 to 5,000
Effective	1,400 to 600	4,000 to 2,500	5,000 to 2,500
Close	600 and under	2,500 and under	2,500 and under

Recruit (Musketry).—A man who has not completed Table A (the recruit's course of musketry).

Sector.—A portion of frontage allotted to a fire-unit for the purposes of observation and fire action.

Snapshooting.—Firing the most accurate possible shot in the shortest possible time.

Superiority of Fire.—The means of pouring a more destructive fire into the enemy than he can bring to bear on you. Under ordinary conditions a necessity prior to the bayonet charge.

Target, Crossing.—A target moving across the front of the firer obliquely or at right angles.

Target, Service.—The various targets of battle.

Trained Soldier (Musketry).—A man who has completed Table A (the recruit's course of musketry).

Trajectory.—The curved line a bullet or other projectile follows in its flight. This is dependent on the explosion of the charge which drives the bullet forward, gravity which draws the bullet towards the earth, and the resistance of the air which retards the velocity of the bullet (Fig. 2).

II. MILITARY VOCABULARY FOR INDICATION AND RECOGNITION OF TARGETS.

Arable Land.—Ground under cultivation other than pasture or grass land.

Brook.—A small stream.

Causeway.—A made road or path, raised by artificial means above the level of the surrounding country.

Clearing.—Where trees and undergrowth have been cut down in a wood, so as to make an open space.

Cliff.—A high, steep rock.

Col.—A gap or break in a ridge of hills, often traversed by a road, which thus avoids to a great extent the ascent and descent otherwise necessary in passing from one side of the ridge to the other. This term is also used to describe the narrow ridge often seen joining a hill to a main chain of hills.

Copse (or Coppice).—A small wood, composed of young trees and undergrowth for cutting.

Crest-Line.—Where the top of a hill or mountain appears to meet the sky.

Cross-Roads.—The point where one road crosses another.

Culvert.—A watercourse arched over with brickwork or masonry, generally under a road or railway.

Cutting.—An excavation through which a railway line runs.

Dense Hedge.—Growing closely together.

Donga.—A South African term, meaning a dry watercourse, bordered by steep and high banks.

Embankment.—Earth banked up above the natural height of the surrounding country, to preserve the level of a railway line.

Fenced.—Bounded by a fence, hedge, wall, etc.

Fencing.—A structure, enclosing a piece of land or separating it from another piece.

Ferry.—A place where a river or other piece of water may be crossed by means of a boat kept at the spot for the purpose.

Fold in Ground.—A slight hollow, caused by the regular lie of the ground being broken by a rise or depression.

Foliage.—The leaves of trees, shrubs, etc.

Ford.—A shallow place in a stream where it may be crossed by wading.

Gorge.—A rugged and deep ravine.

Hollow.—A depression in the ground.

Junction of Roads.—The point where two or more roads meet, but do not cross one another.

Knoll.—A low hill standing by itself.

Level Crossing.—Where a road or path crosses a railway-line at the same level.

Marshland.—Low-lying, wet land, covered usually with rushes and rank vegetation.

Moorland.—Waste land covered with heath, and having a poor, peaty soil.

Nullah.—An Indian term, meaning a dry watercourse bordered by steep and high banks.

Palings.—Narrow pieces of wood nailed closely together upon rails so as to form a fence.

Pastureland.—Grassland.

Plantation.—A small wood, composed of trees recently planted.

Ploughland.—Land which has recently been ploughed.

Posts and Rails.—A fence composed of posts, with one end sunk in the ground, connected by rails.

Quarry.—An excavation from which stone has been extracted.

Ravine.—A deep hollow in a hill or mountain side.

Ridge.—Anything shaped like the back of an animal. For instance, the highest part of a long range of hills or the angular top of the roof of a building.

Ridge and Furrow.—Land ploughed in such a manner that the ground lies alternately heaped up (ridge) and hollowed out (furrow).

River Bank, Right } The right or left bank of a river is the bank on the
" " **Left** } right or left of an observer facing down stream.

Saddle.—A shallow, central dip in a ridge. The depression is less marked than a col.

Scrub.—Stunted trees and bushes growing closely together.

Shrub.—A small bushy tree.

Signal-Box or Cabin.—A small building adjoining a railway-line, from which a set of signals is controlled.

Sky-Line.—Where earth or sea appear to meet the sky.

Slope, Concave.—A slope is concave when the actual slope of a hill offers no obstruction to an observer standing on the crest from seeing the foot of the slope. In this case the upper slopes of the hill are steeper than the lower slopes.

Slope, Convex.—A slope is convex when an observer standing on the crest is unable, through the slope of the hill bulging out, to see the foot of the slope. It is caused by the lower slopes being of a steeper nature than the upper slopes, and is met with especially in chalk downs.

Slope, Forward.—One that falls away in the direction an observer is looking.

Slope, Gentle.—*This term explains itself.*

Slope, Reverse.—One that falls away behind the spot where the observer is standing.

Slope, Steep.—*This term explains itself.*

Spur.—A ridge running out from a hill or from range of hills.

Stream.—Any course of flowing water.

Sunken Road.—A road that has been cut below the level of the surrounding country.

Swamp.—Land so saturated with wet bog as to be useless for cultivation.

Thicket.—A small wood, composed of bushes and undergrowth.

Track.—An unmade path, which is marked by use.

Undergrowth.—Small trees, brambles, creepers, etc., in a wood.

Viaduct.—A road or railway carried by a series of arches over a valley, river, etc.

NOTE.—*The figures at the hinges of pages refer to the* SECTIONS.

MUSKETRY

CHAPTER I

THE CARE AND CLEANING OF ARMS*

Section 1.—General Remarks.

1. Responsibility for Care of Arms.—Officers commanding companies are responsible for the condition of the arms in their charge, and for instructing their men in the use of the gauze, so that no unnecessary wear of the bore may result through its misuse.

2. Defects.—Commanding officers will report in the Regimental Annual Return any defects in the machine guns, rifles, or ammunition in their charge which have not been remedied satisfactorily.

3. Instruction in Care and Cleaning of Arms. — (i) The soldier's training in musketry will commence with instruction, the object of which is to give him a thorough knowledge of the different parts of the weapon with which he is armed. Classes consisting of squads or small numbers will be formed for this purpose under a competent instructor. The construction of the rifle, the nature, function, and names of its different component parts, its action in loading, firing, unloading, and the use of the magazine, will be explained to men, both verbally and by practical demonstration. The parts of the rifle should be shown separately, and then assembled before the class to explain its con-

* See Preface, para. 10.

struction. Instructors should ascertain, by asking the class questions on different points, that each man has thoroughly understood what he has been taught, and possesses a practical knowledge of his weapon. The illustrations in Appendix, I., show the various parts of the different service rifles, and give their names.

(ii) When he has attained this knowledge, the soldier will be taught by means of short lectures how to take care of his weapon, reduce the wear and tear to which it is subjected in ordinary use, and guard it from unnecessary wear and tear and damage from various causes. Finally, the soldier must be taught both by demonstration and practice how to clean his weapon properly without causing damage to it in doing so. Information on these points will be found in this chapter.

Section 2.—Wear and Fouling.

1. Wear.—(i) Wear in the bore of a rifle is due to three causes: (*a*) the friction of the bullet; (*b*) the heat generated when ammunition is fired; and (*c*) the friction of the pull-through gauze when the bore is being cleaned. When care is used in cleaning, 5,000 to 6,000 rounds can be fired from a rifle before it becomes unserviceable.

(ii) **Undue Wear.**—Undue wear is caused by improper and unnecessary use of the pull-through gauze, to prevent which it is most important that the instructions for cleaning be adhered to. It may be necessary to modify these instructions to suit local climatic conditions, or particular rifles which are in a bad state of preservation.

(iii) When a rifle barrel is new, the interior of the bore carries a high polish, and this is a great safeguard against rust and metallic fouling, but as the bore becomes worn, this polish will diminish. Efforts to restore it with wire gauze on the pull-through result in unnecessary wear. In

a well-cared-for rifle, while the brilliancy of the polish will diminish, the lands of the bore should always be bright and free from all stain of rust or fouling.

2. Fouling.—(i) Fouling is of two kinds: (*a*) *Internal*, probably caused by the forcing of gas or harmful material into the pores of the metal; (*b*) *Superficial*, caused by the deposit in the bore of the solid products of combustion of the charge and of the cap composition. The result of neglect in either case is the formation of *rust* in the bore, and, as a consequence, *corroded barrels*, calling for the excessive use of wire gauze, or even more drastic treatment, thereby causing unnecessary wear.

(ii) **Internal Fouling.**—Internal fouling can be removed satisfactorily by the use of boiling water [Sec. 4, para. 6 (ii)]. If for any reason this method of cleaning cannot be used, the barrel will "sweat," and a hard black crust of fouling will appear in the bore. This will turn to red rust if not removed, and the rifle will then require repeated cleaning with flannelette, and probably with gauze, for a time, which will vary according to climatic conditions and the state of the bore.

(iii) **Superficial Fouling.** — Superficial fouling is readily removed, when warm, by the use of a pull-through and flannelette, but if it is allowed to remain long in the barrel, it will become hard and will have a corrosive effect equal to that produced by internal fouling.

3. Nickelling.—The appearance of nickelling, or *metallic fouling*, should be watched for. It is caused by a portion of the cupro-nickel of the envelope of the bullet being left on the surface of the bore, and appears as a whitish streak on the lands, or as a slight roughness on the edge of the grooves. If it is deposited near the muzzle or the breech, it is visible to the eye when the bore is clean, but in the centre of the bore it can only be detected by the use of the gauge plug. It is a cause of inaccuracy, and if a rifle for

no apparent reason shoots badly, its presence should be looked for as a possible explanation. The soldier will make no attempt to remove it himself, but will hand his rifle to the armourer, or other qualified person, to be cleaned.

Section 3.—Materials used for Cleaning Arms.

1. Pull-Through (Fig. 1).—(i) A pull-through fitted with a weight, and an oil-bottle to contain Russian petroleum, are carried in the recess in the butt of the rifle. The pull-through is made with three loops. The first—*i.e.*, nearest the weight—is for the gauze when used; the second for the flannelette; the third is provided merely as a means of withdrawing the pull-through in case of a jamb. Neither flannelette nor gauze should be placed in this loop. When signs of wear appear, a new cord should be supplied, to avoid the risk of the pull-through breaking in the rifle. If a breakage does occur, the rifle must be at once taken to the armourer. No attempt should be made by the soldier to remove the obstruction.

(ii) **Packing the Pull-Through.**—The pull-through is packed above the oil-bottle as follows: Hold the pull-through (loop end) between the forefinger and thumb of the left hand, so that the end falls about 2 inches below the third finger; roll it loosely three times round the first three fingers. Slip the coil off the fingers, and lap it tightly with the remainder of the cord, leaving sufficient to allow the weight to drop easily into the recess in the butt. Push the cord into the trap, leaving the loop end uppermost, drop the weight into the recess, and drop the trap.

2. Use of the Pull-Through.—(i) Remove the bolt from the rifle, and in order to insure the gradual compression of the gauze, if used, and of the flannelette, drop the weight through the bore *from breech to muzzle.* The pull-through should be drawn through in one motion, otherwise the spot

where the flannelette is allowed to rest while a fresh grip of the cord is being taken will not be properly cleaned. Very great care must be taken not to allow the cord to rub against the muzzle, otherwise a groove, technically known as *cord wear*, will be cut, which in course of time will destroy the accuracy of the rifle.

(ii) **Flannelette.** — Only regulation flannelette is to be used. When cleaning or drying the bore after washing

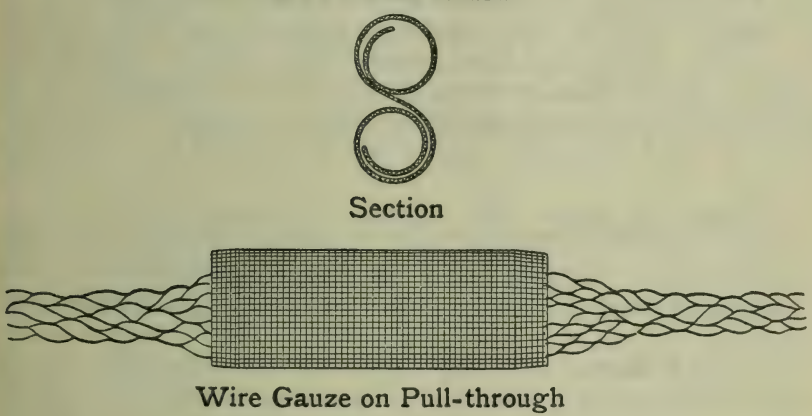


Fig. 1.

out with water, a piece of dry flannelette large enough to fit the bore tightly (about 4 inches by 2 inches) should be placed in the second loop of the pull-through. For oiling the bore, a slightly smaller piece of oily flannelette, which will fit the bore loosely, should be used. Care must be taken not to use too much oil, as it will be squeezed out of the flannelette at the entrance to the bore, and will run down into the bolt when the rifle is placed in the rack, and may then cause miss-fires.

(iii) **Caution.**—The use of *two single pull-throughs attached to one another*, so as to make a double one, is strictly forbidden, because this practice has been found to produce "cord-worn" barrels.

3. (i) **Wire Gauze** (Fig. 1).—Wire gauze in pieces 2½ inches by 1½ inches is supplied, and should be used for the removal of hard fouling or of rust. In attaching it to the pull-through, the following method should be adopted: Turn the shorter sides of the gauze towards the upper, so that the longer sides take the form of the letter **S**. Open the first loop of the pull-through, and put one side of it in each loop of the **S**. Then coil each half of the gauze tightly round that portion of the cord over which it is placed till the two rolls thus formed meet. *The gauze must be oiled thoroughly before use to prevent its scratching the bore.*

(ii) **Object of Gauze.**—The object of the gauze is mainly to scour out the grooves, and it should therefore fit the bore tightly. When it fails to do this, it should be unrolled partially, and packed with paper or flannelette to increase its bulk.

(iii) **Use of Gauze.**—Grit must be removed from the gauze and pull-through before use. Cleaning with gauze entails wear of the bore of the rifle. Gauze should not be pulled through the barrel more often than three or four times without sufficient cause. The surest way of preventing the necessity for the continued use of gauze is to keep the bore well oiled so as to prevent rust. A barrel which has become rusty will always be more liable to rust than one which has been kept in good condition. It will therefore require more attention and more frequent cleaning with gauze. Similarly, a barrel in which erosion has commenced will require more care than one of which the surface has not been attacked, for, the eroded portion being rough, moisture is more likely to collect on it and form rust.

It is also more difficult to remove rust thoroughly from a rough surface than from a smooth one.

4. Oil.—No oil other than Russian petroleum should be allowed to remain in the bore. The function of this oil is to cover the bore with a waterproof film, and thus prevent moisture attacking the steel and forming rust. It must be well worked into the flannelette with the fingers, otherwise it will be scraped off by the breech end of the barrel. When paraffin has been used, all traces of it should be removed thoroughly, and the bore coated with Russian petroleum, for paraffin, though an efficient agent for removing rust, does not prevent its formation.

5. Caution.—*No gritty or cutting material, such as emery powder or bath brick, is to be used for cleaning any part of the rifle.*

Section 4.—Instructions for Cleaning Arms.

1. To Remove the Bolt.—Raise the knob as far as it will go, draw back the bolt-head to the resisting shoulder, and release it from the retaining spring. Raise the bolt-head as far as possible (in the short rifle, Marks I, I*, II, and II*, draw back the charger guide, then turn the bolt-head to the left), and remove the bolt.

2. To Replace the Bolt.—(i) See that the resisting lug and cocking-piece are in a straight line, and the bolt-head screwed home. Place the bolt in the body with the extractor upwards, and press it forward until the head is clear of the resisting shoulder (in the short rifle, Marks I, I*, II, and II*, turn the head to the right, then push the charger guide forward as far as possible). Turn the head downwards until it is caught by the retaining spring. Close the breech, and press the trigger.

(ii) In some rifles, the bolt can be replaced and closed with the bolt-head unscrewed a whole turn. It cannot, how-

ever, be closed with the bolt-head in this position if there is a cartridge in the chamber. The greatest care should therefore be taken to see that the bolt-head is screwed fully home before the bolt is placed in the rifle.

3. Daily Cleaning.—The outside of the rifle will be cleaned daily, and all parts of the action wiped with an oily rag. The bore of the rifle will always be left oily, but once a week this oil will be removed and the bore relubricated. In the case of rifles that have once become rusty, the bore will be wiped out with flannelette and reoiled daily, and it will, in addition, be cleaned once a week with the gauze on the pull-through. The gauze is to be packed as already stated, so as to fit the bore tightly.

4. Cleaning before Firing.—(i) The action will be wiped with an oily rag, and all traces of oil will be removed from the bore and chamber by the use of a pull-through *which has no gauze on it.*

(ii) **Caution.**—Neither the cartridge nor the chamber of the rifle are on any account to be oiled before loading, nor is any other form of lubricant to be used with a view to facilitate the extraction of the empty case. Such a procedure greatly increases the thrust on the bolt-head due to the explosion of the charge, and is liable to injure the rifle.

5. Cleaning after Firing.—(i) Arms will be cleaned immediately after firing. The fouling can be removed easily while it is still warm, and before it has had time to set hard; while the less the time allowed for the fouling to exercise its power of absorbing moisture from the air, the less chance is there of rust forming. *If it is impossible to clean the rifle at once, an oily rag should be pulled through the bore, and the rifle should be cleaned at the earliest opportunity.*

(ii) **After firing Blank Ammunition.**—After firing blank ammunition, special care should be taken that the cleaning is thorough, as, although there is no friction between bullet and bore, and so no internal fouling or "sweating," there is

greater accumulation of superficial fouling from blank than ball cartridge. This is due to the fact that there is no bullet in blank ammunition to scour the fouling left by the preceding round. The firing also is in most cases more prolonged, and a greater interval most usually elapse before the rifle can be cleaned thoroughly. *When blank firing precedes practice with ball, the rifles will be cleaned carefully before ball practice commences.*

6. Cleaning the Bore.—(i) The following method of cleaning the bore should be adopted. Thoroughly oil the gauze to prevent it scratching the surface of the metal. Drop the weight of the pull-through through the bore from the *breech*, and pull the gauze through three or four times. Then place a tightly fitting piece of dry flannelette in the second loop of the pull-through, and draw it through till the bore is clean. Finally oil the bore with a loosely fitting piece of flannelette, using enough oil to cover the bore thoroughly. *The rifle will be cleaned in this manner for three days following that on which it was fired.*

(ii) **Use of Boiling Water.**—An effective means of cleaning the bore, whether firing has taken place or not, is found in the use of boiling water. Before boiling water is used superficial fouling and grease should be removed. About 5 or 6 pints should be poured through the bore from the breech, using a *funnel to prevent its entering the body or magazine.* The rifle should then be dried thoroughly and the bore oiled. Not only does the boiling water remove the fouling, but the expansion of the metal due to the heat of the water loosens any rust there may be, and facilitates its removal.

7. Cleaning the Action and Exterior—(i) **Bolt.**—Thoroughly clean the bolt, paying particular attention to the face of the bolt-head, the striker point, and the extractor, *If the bolt requires cleaning inside it will be taken to the armourer.*

(ii) **Magazine.**—See that the recess for the extractor spring is clear of dirt. Take out the magazine and wipe the inside of the body and the entrance to the chamber with an oily rag. Remove all dirt from the slots in the charger guide and from the extractor recess in the front of the body. Take out the magazine platform if required, and clean the inside of the magazine with a dry rag.

(iii) **Exterior.**—Wipe the exterior of the rifle with an oily rag, seeing that the **U** of the backsight, the hole in the aperture-sight, the gas escape holes, and, in the short rifle, the rack on the side of the leaf, are free from dirt. Remove any fouling which has collected on the bayonet boss on the nose-cap. *If allowed to accumulate, this may cause difficulty in fixing the bayonet.*

(iv) **Caution.**—The instructions regarding the use of an oily rag for cleaning the bolts and bodies will not apply *in dusty countries, where all parts of the action will be kept dry and clean.*

8. Cleaning ·22-inch Rifles and Aiming-Tubes.—(i) As a foul rifle shoots very inaccurately it is of the utmost importance, from considerations of safety, that the barrel should be wiped out frequently during use.

(ii) **Rod and Brush.**—The rod and brush should be inserted from the *breech end.* Under no circumstances should they be inserted from the muzzle, as the friction of the rod is liable to enlarge the bore and make the muzzle bell-mouthed, thus causing inaccuracy.

Section 5.—Instructions for Care of Arms and Ammunition.

1. Care of Arms.—(i) When the rifle is *not in use,* the leaf and slide of the backsight should be lowered to avoid the risk of damage from a blow or fall. *No non-commissioned officer or soldier is permitted to take to pieces any portion of*

the action, except as prescribed for cleaning, nor is he allowed to loosen or tighten any of the screws, unless authorized to do so by his company commander.

(ii) **Mainspring.**—The mainspring should never be allowed to remain compressed, except when the rifle is loaded, as the spring will thereby be weakened. The position of the cocking-piece shows whether the mainspring is compressed or not.

(iii) **Pull-off.**—The pull-off is the amount of pressure which is required to release the nose of the sear from the full bent of the cocking-piece; it should not be heavier than 6 nor lighter than 5 pounds in the short rifle, and not heavier than 7 nor lighter than 5 pounds in other rifles. Defects in the pull-off should be remedied by the armourer only.

(iv) **Magazine.**—The magazine must not be removed from the rifle except for cleaning purposes, and, to avoid weakening the spring, cartridges should only be kept in it when necessary. A failure of the spring to raise the platform can usually be overcome by tapping the bottom of the magazine smartly with the palm of the hand. If the failure recurs, the rifle should be taken to the armourer for examination and repair.

(v) **Bolt.**—The bolts of rifles are not to be exchanged. Each bolt is carefully fitted to its own rifle, so that the parts which take the shock of the explosion have an even bearing, and the use of a wrong bolt will affect the accuracy of the rifle. *The number stamped on the back of the bolt lever should agree with that stamped on the right front of the body.*

(vi) **Browning.**—Care should be taken to prevent the browning being rubbed off the rifle.

(vii) **Cover in Dusty Countries.**—In dusty countries it may be found necessary to cover the muzzle and bolt with a cover of khaki or other suitable material, to prevent the dust

gaining access to the interior of the rifle, but anything in the nature of a plug in the muzzle is expressly prohibited.

(viii) **Removal of Oil.**—The oil will only be removed from the bore of the rifle—

(*a*) Immediately before firing.

(*b*) For inspection, which, except after firing, should not as a rule be more often than once a week.

(*c*) For parades and duties as may be ordered by the commanding officer.

In all cases it will be replaced as soon as possible.

2. Bayonets.—After firing with bayonets fixed, the bayonet should be carefully wiped before it is returned to the scabbard. All oil should be removed from the blade before placing a bayonet in the scabbard.

3. Care of Ammunition.—(i) Ammunition should be kept perfectly dry and clean, and should not be exposed to extremes of temperature.

(ii) **Miss-Fires.**—A miss-fire arises from—

(*a*) A defective cartridge.
(*b*) A defective rifle.

In case (*a*) the cartridge will be tried in another rifle, and, if it still fails to fire, a report will be made in accordance with the instructions contained in the King's Regulations. In case (*b*) the rifle will be taken to the armourer for examination.

Section 6.—Examination of Small Arms.

1. Instruction of Officers.—It is necessary for all company officers and sergeants to possess a competent technical knowledge of the inspection, care, and preservation of small arms. Commanding officers will therefore arrange that they shall be instructed annually by the regimental armourer in repairing faults most likely to occur in the field

with such tools as would be available, and in the examination of the various components as directed in the following paragraphs:

2. Examination of M.L.M. Rifles.—(i) The interior of the barrel for rusts and cuts.

(ii) (*a*) The backsight leaf for firmness of joint; that it is not bent; that the slide moves smoothly and fits firmly on the leaf; that the V is not deformed; and that the lines on the slide are clearly marked.

(*b*) The foresight; that the barleycorn is not deformed.

(iii) The aperture and dial sights; that they are not bent, and work smoothly.

(iv) The bolt cover; for security on the bolt and clearance of the body.

(v) The cocking-piece; for firmness on the striker, that the bents are in good condition, and that the sear nose bears properly.

(vi) The sear; for height of the nose, which should just clear the bottom of the resisting lug on the bolt.

(vii) The butt; that the stock-bolt is properly screwed up.

Note.—In arms marked "2" on the right of the butt, and at the socket of the fore-end, the latter must be removed before attempting to turn the stock-bolt. In screwing it home the precautions prescribed in sub-para. xvii will be carefully observed.

(viii) The cocking-piece and striker; that they fly forward freely on pressing the trigger.

(ix) The striker-point; that it is the correct shape and projects sufficiently through the face of the bolt-head.

(x) The magazine; that it is not dented, and that the platform works freely.

3. Examination of M.L.E. Rifles.—The same as for rifles M.L.M., with the following addition:

(xi) Safety-catch; that the bolt of the safety-catch engages in the slots in the extension at the end of the bolt.

M.L.E. Charger-Loading Rifles. — The same as (i), (iii), (v), (vi), (vii), (viii), (ix), (x), and (xi), with the following additions:

(xii) (*a*) The backsight leaf, for firmness of the joint; that it is not bent; that the slide moves freely; that the clamping screw engages properly; that the windgauge fits firmly; and that the U is not deformed.

(*b*) The foresight; that the blade is not deformed.

4. Examination of Short, M.L.E., Marks I and I,* and Converted Marks II and II* Rifles.—The same as (i), (iii), (v), (vi), (viii), (ix), and (x), M.L.M. Rifles, with the following additions:

(xiii) (*a*) The backsight leaf, for firmness of the joint; that it is not bent; that the fine adjustment and windgauge fit firmly; that the slides move smoothly; that the catches engage in the racks on both sides of the leaf; and that the V is not deformed.

(*b*) The foresight; that the barleycorn is not deformed.

(xiv) The bolt; that the striker is not too free on the cocking-piece, and that it is not screwed too far into the latter; also that the striker keeper nut-screw (or the striker keeper-screw if fitted) is not broken, and that the nut is in its proper position.

(xv) The bolt-head; that the charger guide is not too loose on the bolt-head; that it works smoothly; and that the top screw is intact.

(xvi) The safety-catch and locking-bolt; that the safety-catch engages in the camway of the bolt and locks it; that it does not move too easily; and that the cocking-piece is withdrawn slightly to the rear when the locking-bolt is applied, whether it is at "full cock" or the "fired" position.

(xvii) The butt; that it is not loose. If the stock-bolt requires screwing up to tighten the butt, the fore-end must first be removed. On reassembling, great care will be taken

that the square end of the stock-bolt which protrudes through the socket of the body is in the correct vertical position, so that it may enter the keeper-plate properly when the fore-end is replaced. On replacing the fore-end, see that the fore-end stud and spring, where fitted, are in proper position; the front guard and inner band-screws must be tightened carefully.

5. Examination of Short, M.L.E., Mark III, and Converted Mark IV Rifles.—The same as (i), (iii), (vi), (viii), (ix), (x), (xiv), (xvi), and (xvii), with the following additions:

(xviii) (*a*) The backsight leaf, for firmness of the joint; that it is not bent; that the windgauge fits firmly; that the slide moves smoothly, that the thumb-piece and fine adjustment worm work freely and engage in the rack on the side of the leaf; and that the **U** is not deformed.

(*b*) The foresight; that the blade is not deformed.

6. Drill Purpose Rifles.—These instructions apply also to *Drill Purpose rifles*. As these are used for the instruction of recruits in aiming, particular attention should be paid to the state of the sights.

Section 7.—Inspection of Arms on Parade.

1. For Inspection—Port Arms.—Cant the rifle, muzzle leading, with the right hand smartly across the body, guard to the left and downwards, the barrel crossing opposite the point of the left shoulder, and meet it at the same time with the left hand close behind the backsight, thumb and fingers round the rifle, the left wrist to be opposite the left breast, both elbows close to the body.

Turn the safety-catch completely over to the front with the thumb or forefinger of the right hand (with Lee-Enfield or Lee-Metford rifle, lower the safety-catch with the thumb of the right hand). Pull out the cut-off if closed, first pressing it downwards with the thumb, then seize the knob

with the forefinger and thumb of the right hand, turn it sharply upwards, and draw back the bolt to its full extent, then grasp the butt with the right hand immediately behind the bolt, thumb pointing to the muzzle.

Note.—A squad, before being inspected, will receive the command *Rear Rank, One Pace Step Back—March.*

2. To Ease Springs and come to the Order—Ease Springs.—From the position described above, work the bolt rapidly backwards and forwards until all cartridges are removed from the magazine and chamber,* allowing them to fall to the ground, then close the breech (with Lee-Enfield or Lee-Metford rifle, the cut-off should first be closed), press the trigger, close the cut-off by placing the right hand over the bolt, and, pressing the cut-off inwards, turn the safety-catch over to the rear, and return the hand to the small.

Or, if the Magazine is Charged—

Lock-Bolt.—Close the breech (with Lee-Enfield or Lee-Metford rifle, the cut-off should first be closed), then turn the safety-catch over to the rear (with Lee-Enfield or Lee-Metford rifle raise the safety-catch), and return the hand to the small.

Order Arms—One.—Holding the rifle firmly in the left hand, seize it with the right hand at the band (with Lee-Enfield or Lee-Metford rifle, at the lower band).

Two.—As in the second motion of the *order* from the *slope.*

Three.—As in the third motion of the *order* from the *slope.*

3. Instructions for Inspecting Arms.—(i) When arms are inspected at the *port* only, as in inspecting a platoon on parade, the officer or non-commissioned officer will see that the exterior of the rifle is clean and free from rust; that the magazine and action are clean and in good order; that the sights are at zero; and that no parts are loose or damaged. He will here and there examine the bore of a rifle to see

* This precaution will also be adopted when magazines are not charged.

that it has been cleaned and oiled, and is free from obstructions.

(ii) Each soldier, when the officer has passed the file next to him, will, without further word of command, *Ease Springs*, *Order Arms*, and *Stand at Ease*. When the inspection is completed, the squad will be closed on the squad commander's command *Close Ranks—March*, when the rear rank will take one pace forward.

4. To Examine Arms—Examine—Arms.—Both ranks, being at the *port*, will come to the position for loading (Sec. 27, para. 1 (1), with the muzzle so inclined as to enable the officer to look through the barrel, the thumb-nail of the right hand being placed in front of the bolt to reflect light into the barrel.

The soldier, when the officer has passed the next file to him, will act as detailed in para. 3 (ii) above.

Notes.—(i) If it is necessary to examine arms, the men, when in the position of *for inspection, port arms*, will be cautioned to remain at the *port*. Ranks will be closed, as in para. 3 (ii), when the examination has been completed.

(ii) In ordering arms from the examine, the first motion is to seize the rifle with the right hand between the back-sight and the band, at the same time bringing the left foot back to the right. With the second motion the rifle will be brought to the order, the left hand being cut away to the side.

CHAPTER II

THE THEORY AND PRACTICAL APPLICATION OF RIFLE FIRE

Section 8.—General Information.

1. Need of Theoretical Knowledge.—A knowledge of the theory of rifle fire is of great importance in enabling the best use to be made of the powerful and accurate weapon with which the soldier is armed. The next step in the soldier's musketry training after he has been instructed in the construction, care, and cleaning of his rifle will therefore be devoted to teaching him the theory and application of rifle fire. This instruction will consist of lectures, important points being illustrated by the aid of diagrams or drawings made with chalk on a blackboard, and by practical demonstrations when possible.

2. Difference between Peace and War Conditions.—(i) It is, however, of the utmost importance that the soldier should be taught from the first to apply his theoretical knowledge correctly. *The soldier must be made to realize clearly that the moral conditions under which fire is delivered in war are very different from those of peace.* Therefore deductions made as to the effect of fire from the theory of musketry applied under peace conditions, when firing takes place on open level ground under good conditions of light and atmosphere at visible targets at known distances with weapons in good condition in the total absence of any strain of excitement or fatigue and of the enemy's fire,

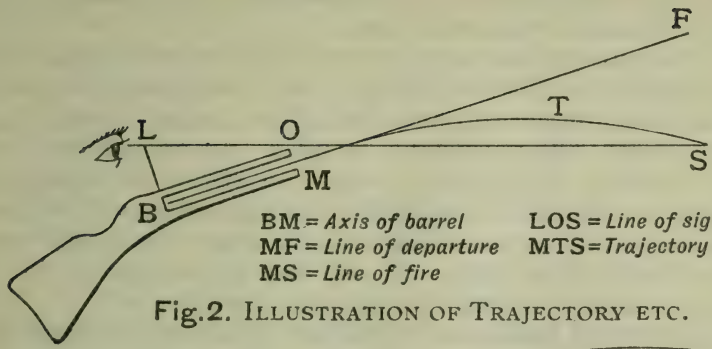


Fig.2. ILLUSTRATION OF TRAJECTORY ETC.

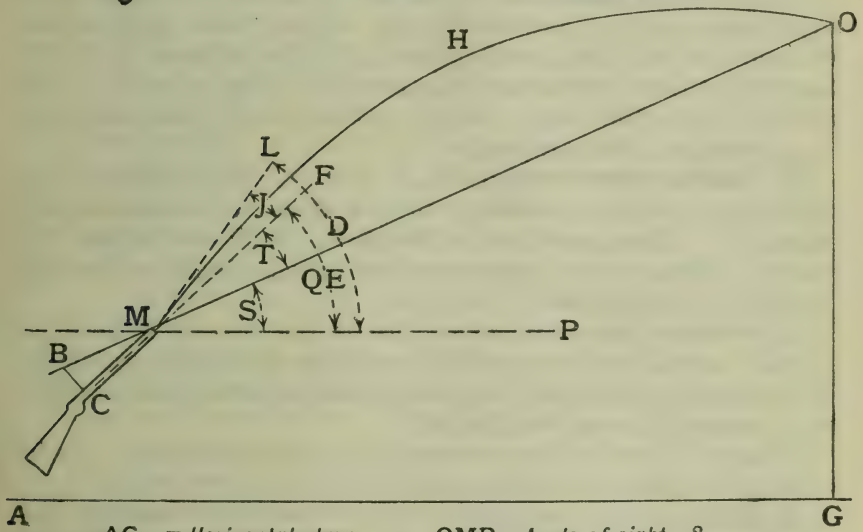


Fig.3. ILLUSTRATION OF TRAJECTORY ETC.

must not be applied to conclusions as to the effect of fire delivered under war conditions.

(ii) For under war conditions targets beyond close range are usually invisible or indistinct, and frequently in motion; distances are uncertain and difficult to judge; firing takes place under all conditions of light and atmosphere over every variety of ground, under the strain of excitement and fatigue in the face of artillery and rifle fire, with weapons which rapidly become imperfect owing to heavy wear. Accordingly, the theory of rifle fire is considered in this book in relation to practical service conditions.

3. Technical Terms.—The different technical terms used in this chapter in explaining the theory and application of rifle fire will be found among the Definitions (p. xxii). Some of these terms are illustrated in Figs. 2 and 3. In addition, the following technical terms may conveniently be quoted in this paragraph:

(i) **Individual Fire.** — Individual fire is fire opened by individual soldiers without orders from a fire-unit commander. When men fire individually, each one selects his target, estimates the range, and regulates his fire according to his own judgment.

(ii) **Collective Fire.**—Collective fire is the fire of a number of men combined for a definite purpose under the orders of a fire-unit commander, who indicates targets, gives ranges, and controls fire as to rate, etc.

Note.—Collective fire is necessarily controlled fire. *Individual fire will also be controlled if circumstances permit.*

4. Rifling.—A gun-barrel is said to be rifled when it has spiral grooves cut down the bore. Rifling a barrel enables an elongated bullet to be used instead of the round "ball" of former days. The advantage of this form of bullet is that it has great weight in proportion to the surface directly opposed to the air. It has therefore great power of overcoming the resistance of the air, and thus maintaining its

velocity and penetrating force* over greater distances than would otherwise be possible. Moreover, when the charge is fired, the bullet is forced into and follows the spiral grooves up the barrel, the effect of which causes it to leave the muzzle rotating or spinning on its longer axis. This spin tends to keep its point foremost, and therefore to ensure accuracy of flight.

5. Forces Acting on the Bullet.—Three forces act on the bullet: (*a*) The explosion of the charge, (*b*) gravity, and (*c*) the resistance of the air. The explosion of the charge drives the bullet forward. Gravity—the natural attraction which draws all unsupported bodies towards the centre of the earth with ever-increasing velocity—acts on the bullet immediately it leaves the muzzle. The resistance of the air causes the velocity of the bullet to decrease rapidly during its flight.

6. Trajectory.—The combined effect of these forces causes the bullet to travel in a curved line called the *trajectory*, the curvature of which becomes more pronounced the longer the bullet is exposed to their action. Thus, a Mark VI bullet leaving the muzzle of a service rifle at the rate of about 2,060 feet per second falls about $4\frac{1}{2}$ inches below the line of departure in the first 100 yards. This drop is increased to about 20 inches at 200 yards. With Mark VII ammunition, giving a muzzle velocity of 2,440 feet per second, the drops at the above distances are about 3 inches and 13 inches respectively. Imaginary not actual curves of trajectories are shown in Figs. 6 and 8.

7. Method of Explaining Trajectory.†—(i) In explaining the trajectory to recruits it is not sufficient merely to show

* For the maximum penetration of the pointed bullet in various substances see Appendix, *Field Entrenchments*, of this series.

† Tables giving the maximum height of the trajectory of the Mark VI and VII bullets at different ranges, together with tables showing the angles of descent for the last 100 yards of each range, will be found in *Musketry Regulations.*

or draw a diagram representing a trajectory distorted in respect of height and range. When possible the actual path of the bullet through the air at various short ranges—say 400 and 800 yards—should be shown by means of discs raised on poles at every 100 yards, or some similar device.

(ii) It must be explained to the soldier that the further an object has to travel and the longer it is suspended in the air, the higher it must be thrown to counteract the force of gravity, because the greater the distance it travels and the longer it remains in the air the longer will the object be affected by the force of gravity. Consequently the longer the range the higher will the curve of the trajectory take the bullet in its flight, and the steeper will be the angle at which it will fall to the earth.

(iii) On the other hand, the shorter the distance an object is thrown, and the swifter its flight through the air, the less will it be influenced by the force of gravity during its flight, and the lower or flatter will its trajectory be in consequence. Thus, with the backsight adjusted for the distances in question, a Mark VI bullet does not rise above the height of a man on foot at 500 yards range, or above the height of a mounted man at 600 yards range. With Mark VII ammunition, the bullet does not rise above these heights at 600 and 700 yards range respectively.

8. Firing at Close Range without Altering Sights.—*It is therefore evident that effective fire can be maintained within close range without alteration of the backsight.* Apart from the flatness of the trajectory at close range, and the consequent inclusion of distances within close range in dangerous space (Sec. 9), there will seldom be opportunities for altering sights at close range on service, and necessary allowances for elevation must be made by aiming up and down (Sec. 21).

9. Elevation.—In order to allow for the fall of the bullet, owing to the force of gravity, it is necessary to direct the

line of departure as much above the object to be hit, as the bullet will fall below it at any given distance if the axis of the barrel of the rifle is pointed at the mark. This raising of the barrel to allow for the curve of the trajectory is termed *giving elevation*. The target must of necessity be kept in view. The rifle is therefore provided with sights, which permit the firer to give the elevation required whilst keeping his eye fixed on the mark.

10. The Sighting of Rifles.—(i) In the sighting of rifles a *mean graduation for each range has been adopted*, and a high general standard of accuracy for all practical purposes is thus obtained. Each rifle is carefully tested before issue, but it must be understood that *no two rifles behave in an exactly similar manner*, and that even if compensation could be made for every error in the sighting of the rifle before issue, the wear of parts and the loosening or tightening of screws, etc., would bring about faults from time to time which would affect the shooting of each rifle differently.

11. Need of Knowledge of Each Weapon.—*It is therefore necessary that every man should study the shooting of his own rifle*, and make himself acquainted with any incorrectness of the graduations marked on the backsight, in order that he may be in a position to give his rifle the correct elevation for the estimated or ascertained range of the target. *At longer ranges the backsight elevation may be regarded as the best possible guide to errors under all conditions, or any error may be ascertained by using a long-range sighting target.**

12. Jump.—Owing to the shock of discharge, a vibratory or wavy motion is set up in the barrel, which slightly affects the line of departure of the bullet as it leaves the muzzle, and which is known as "jump." The causes and extent of jump are dealt with in the textbook of *Small Arms*.

* This target is described in para. 152, *Musketry Regulations*, Part II.

The effect of jump is allowed for in the sighting of the rifle, *and will not be taken into account by the soldier in aiming.*

13. Drift.—Drift is the term used to express the *lateral deviation* of the bullet after it has left the barrel. This is due to the direction of the rifling, which causes the bullet to rotate from right over to the left in its flight, so that the point works over slightly to the left, owing to gyroscopic action. The consequent increased air-pressure on the right side of the bullet forces it to the left as it flies. *The deflection due to drift at distances within* 1,000 *yards is negligible, and need not be taken into account by the soldier in individual firing.* Beyond 1,000 yards up to the limit of effective rifle fire at about 1,400 yards, drift will carry the bullet about 7 feet to the left. This deflection, if necessary, will be taken into account by fire-unit commanders in directing concentrated fire at narrow-fronted targets at longer ranges.

14. Effect of Fixing the Bayonet.—(i) When the bayonet is fixed to the muzzle of the rifle, its weight checks the jump, and in consequence slightly affects the position of the muzzle at the moment of the departure of the shot, and the primary direction given to the bullet.

(ii) **Short Magazine Lee-Enfield Rifle.** — With Mark VI ammunition, the accuracy of the short magazine Lee-Enfield rifle is not appreciably affected by fixing the bayonet. With Mark VII ammunition, the soldier will aim down slightly in firing with fixed bayonet at ranges up to 600 yards.

(iii) **Lee-Metford or Charger-Loading Lee-Enfield Rifles.** — With Mark VII ammunition, fixing bayonets has a negligible effect. When firing Mark VI ammunition from the Lee-Metford or Charger-loading Lee-Enfield rifles with fixed bayonets at ranges up to 600 yards, the soldier should aim up very slightly, taking care, however, in doing so to

aim low in all cases, and to aim at the ground-line in firing at troops advancing towards him.

15. Effect of Resting the Rifle.—For practical purposes, the shooting of the rifle is not affected by resting the muzzle or any portion of the stock lightly on earth or other substance.

16. Effect of Oily Barrel.—The first round fired from an oily barrel is liable to follow an erratic course, the rifle throwing sometimes high, sometimes low, and at other times to the right or left. A dry rag should therefore be passed through the bore before practice is commenced.

Section 9.—Dangerous Space—Ricochets—Firing Up and Down Hill.

1. Dangerous space may broadly be defined as the whole ground covered by the trajectory of a bullet from the point where it could first come in contact with the top of an object fired at to the point where it falls to the earth (Figs. 4 and 5, and Figs. 6 and 8).

2. Extent of Dangerous Space.—The extent of dangerous space depends upon the following factors:

(i) **Range.**—Dangerous space decreases as the range increases, the reduction being due to the steeper angle at which the bullet descends at longer ranges (compare Figs. 4 and 5).

(ii) **Firer's Position.**—The position of the firer and the consequent height of his rifle above the ground will affect dangerous space. *The nearer the rifle is to the ground when it is fired, the greater will be the extent of dangerous space.*

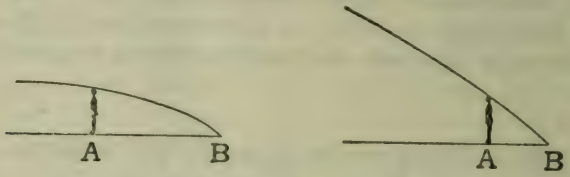
(iii) **Height of Object.**—As a rule the higher the object fired at is, the greater will be the extent of dangerous space.

(iv) **Trajectory.**—The flatter the trajectory—the closer

the bullet keeps to the ground in its flight—the greater as a rule will be the extent of dangerous space.

(v) **Conformation of Ground.** — The more nearly the slope of the ground conforms to the curve of the trajectory and to the fall of the bullet, the greater will be the extent of dangerous space (see Fig. 8).

3. Example of Conditions affecting Dangerous Space.— The following example illustrates the method by which the



Figs. 4 and 5.—DANGEROUS SPACE.

Note.—The angles of descent are imaginary, and not accurate for any distance.

soldier may be made to realize the importance of this question, and the principle which underlies its influence upon the effect of fire: If he is firing in the *lying position* with Mark VI ammunition, and aims at the ground-line of a prone figure at 500 yards range, the dangerous space of his fire will be *about* 50 *yards*. If, however, *he stands* to fire at the same target, the dangerous space will be reduced to *about* 40 *yards*.

4. Ricochets.—Bullets which rebound after striking the ground or any other obstacle, and continue their flight, are said to ricochet. Ricochets may occur from any surface, and bullets may ricochet two or even three times before their flight is finally arrested. At long range, they are less likely to ricochet from soft ground than from hard, smooth surfaces.

5. Firing Up and Down Hill.—(i) When a shot is fired at a target placed on the same level as the firer, the forces

acting on the bullet cause it to travel in its greatest curve, and the greatest elevation for any given distance must therefore be given to the rifle. If a shot is fired perpendicularly upwards or downwards, no elevation is required, for the bullet will travel in an approximately straight line until its impetus is exhausted. Hence it follows that, when shooting up or down hill, less elevation is necessary than when the object is on the same level.

(ii) *For practical purposes, the effect of firing up and down all moderate slopes will be negligible, and may be disregarded by the soldier in taking aim on service.* Within close range, in firing up and down steep slopes, or slopes at an angle of 10 degrees and over, the decreased elevation necessary will usually be small, and may be allowed for by aiming down slightly. The correct elevation to be used in firing up or down hill at longer ranges in various circumstances is a matter for the judgment of fire-unit commanders, and can best be ascertained by careful observation of fire, when possible.

Section **10.**—Effects of Barometric Pressure, Temperature, Wind, and Light.

1. Barometric Pressure and Temperature.—Rifles are sighted for the following conditions: Barometric pressure, 30 inches (sea-level); thermometer, 60° F.; still air; a horizontal line of sight.

2. The rise and fall of barometric pressure and temperature affect the flight of the bullet and elevation by changing the density of the atmosphere, and so increasing or decreasing its resistance to the bullet. For practical purposes, the soldier may disregard the effects of barometric pressure and temperature as negligible. In operations conducted at considerable heights above sea-level, orders as to

allowance for barometric pressure will, if necessary, be issued by the Staff.

3. Effect of Wind—(i) **Head Wind, or Wind from the Front.**—A head wind, or wind from the front, retards the bullet, and necessitates *more elevation.*

(ii) **Rear Wind.**—A rear wind lessens the resistance of the air, and necessitates *less elevation.*

(iii) **Side Wind.**—A side wind, or wind blowing *at right angles* from either side across the front, acts on the greater surface of the bullet, and has, consequently, more influence on its flight than a wind blowing from the front or rear.

(iv) **Oblique Winds.** — Oblique winds, or winds blowing from any intermediate direction between a right angle and a front or rear wind, have the same effect in varying degree as side winds. Oblique winds, in addition, affect the bullet to some extent in the same way as head and rear winds.

4. Allowance for Head and Rear Winds.—No fixed rules can be laid down regarding the degree to which elevation should be increased or decreased at different ranges for head and rear winds. For practical purposes, the effect of these winds may be disregarded at ranges under 1,000 yards. At longer ranges, fire-unit commanders will use their judgment in directing fire, whether they will allow for strong head and rear winds by increasing or decreasing elevation, and to what extent.

5. Allowance for Side and Oblique Winds (see also Sec. 20, *Aiming-Off*).—(i) No fixed rules can be laid down as to the degree of allowance to be made by aiming-off for side and oblique winds of varying direction and velocity. Owing to the increased time during which the bullet is exposed to the effect of wind, and owing to the height attained in its flight, the allowance for wind at long ranges must be out of all proportion greater to that necessary at close range.

(ii) At close range, whether fire is distributed along the dense line of an infantry attack or concentrated on narrow-

fronted attacking columns, the effect of side wind will cause little, if any, loss of fire effect. Individual soldiers, however, in taking the deliberate aim necessary for fire effect, should aim off for side winds of different velocity (see Sec. 20, para. 3).

(iii) In directing fire beyond close range, fire-unit commanders must use their judgment in allowing for deflection due to side and oblique winds by including directions for aiming-off in fire orders. The extent of the allowance will in every case depend upon a variety of factors, including the direction and velocity of the wind and the distance of the target. Neglect to make due allowance for strong winds at longer ranges may lead to loss of fire effect, more particularly in the case of concentrated fire aimed at narrow-fronted targets, such as a machine-gun.

6. Effect of Light.—In bad light, the foresight is less distinctly seen than in good light, and more of it is unconsciously taken into the line of sight. For practical purposes, the effect of light may be disregarded in firing at all ranges.

Section 11.—Need for Collective Fire.

1. (i) Only exceptional targets and very favourable atmospheric conditions will justify soldiers in opening individual fire at distances beyond about 600 yards. Collective fire is necessary to give reasonable assurance of fire effect beyond about 600 yards up to about 1,400 yards, which is usually the limit of effective rifle fire. *Beyond 1,400 yards, the fire of even large and well-controlled units of infantry has seldom much effect upon the decision of the struggle for superiority of fire.*

(ii) Collective concentrated fire is also used to form a cone of fire for observation of fire, when results can be noted by the dust raised by the strike of bullets on the

ground or by the effect of fire upon the enemy. It must be clearly impressed upon the mind of the soldier at this stage that, *however skilful individual men may be as marksmen, the greatest effect is produced by their fire only when it is efficiently directed and controlled.*

2. (i) The soldier must also be made to understand clearly why effect cannot be obtained from individual fire in battle beyond close range, and why collective fire is necessary for fire effect at all ranges beyond close range. The answer to this question may be stated simply and very broadly as follows: In effect, for various reasons, the individual marksman cannot as a rule see his target clearly or at all with the naked eye beyond close range on service, and he can neither aim at it with accuracy nor be certain of its exact range. Moreover, the effect of inaccurate firing, whether due to excitement, fatigue, or other causes, increases with distance.

(ii) Clearly, therefore, the soldier cannot obtain reasonable assurance of fire effect by individual fire beyond close range. Accordingly, fire-unit commanders equipped with field-glasses discern and indicate targets to him. They give him ranges after they have been ascertained by the use of range-finding instruments, or by observation of fire, when possible, and they direct the fire of a number of individual soldiers in a volume which, whether distributed or concentrated, is sufficient to compensate for individual errors, and so obtain fire effect as described in Secs. 12 and 13, and in Chapter VI.

3. The principal reasons which militate against the assurance of fire effect, by individual fire, beyond close range may be summed up as follows: The effects of fatigue and excitement on the firer; the effects of atmosphere, heat, and light; errors due to imperfections in the rifle and ammunition; uncertainty in estimating longer ranges; the difficulty of discerning and aiming at small, moving, and

indistinct or invisible targets; and the steepness of the angle of descent of the bullet, which becomes rapidly accentuated, and so decreases dangerous space as range increases.

4. The soldier must be made to realize that the results of errors of marksmanship due to these various causes *increase in extent as the range increases*, and that they reach their maximum at longer ranges; that is to say, targets become smaller and more difficult to see and to aim at, their range becomes harder to estimate, and the accuracy of fire for other reasons stated becomes less as the range increases. *Therefore, the effect of individual fire decreases as the range increases.* It is easily possible for instructors in the course of lectures on this point to make it sufficiently clear to men that, under service conditions at longer ranges, effect must be obtained from collective fire rather than from individual fire, for all the above reasons. In some degree this important principle of the science of modern warfare can be demonstrated by firing at service targets on full distance and also on miniature ranges (see Chapter X).

Section 12.—Dispersion of Individual and Collective Fire.

1. Shot Groups.—Owing to errors on the part of the firer, and also to imperfections in the rifle and ammunition, it is found that a series of shots, even when fired by an individual under perfect conditions at a large, stationary, distinct target at a known and close range, do not all strike the point aimed at, but they form a group of shot-marks about this point, the density of which varies mainly with the skill of the firer.

2. Cone of Fire (Fig. 6).—It is evident that the trajectories of these shots will not coincide, but will together form a figure termed "the cone of fire." It is also clear that,

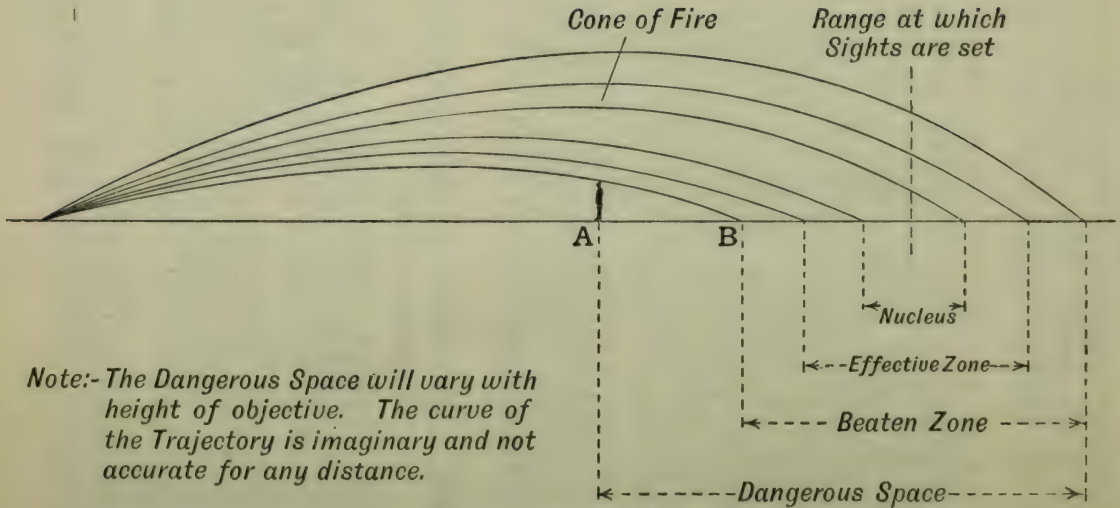

Cone of Fire
Range at which Sights are set
A
B
Nucleus
Effective Zone
Beaten Zone
Dangerous Space
Note:- The Dangerous Space will vary with height of objective. The curve of the Trajectory is imaginary and not accurate for any distance.

Fig.6. CONE OF FIRE

A—B shows the dangerous space due to height of objective.

when aim is well directed, the bullets of a cone of fire should always strike an object so long as the shot group formed by it is either *smaller or of the same size* as the object aimed at. But when the shot group is spread over a larger surface than the size of the object, shots must necessarily miss the mark in proportion as the size of the grouping exceeds that of the object aimed at.

3. Dispersion of Individual Fire.—It is clear, therefore, that the dispersion of individual fire explained in para. 1 will of itself, apart from the various factors mentioned in Sec. 11, militate against the assurance of fire effect by individual fire at longer ranges, because the dispersion of fire will become greater as the target decreases in size, owing to distance, and the shot group will consequently be spread over a much larger surface than that of a long-range service target, even if stationary and visible to the naked eye.

4. Dispersion of Collective Fire.—When a body of soldiers fires with the same elevation at the same object, the dispersion of shots is accentuated by the varying skill and eyesight of the men, with the result that the cone formed will be of larger dimensions than in the case of individual fire. The dimensions of the cone of fire will again be further increased if the firers are from any cause, such as fatigue or excitement, unsteady; if the rifles are in bad condition or the target indistinctly seen—factors which are all incidental to firing under the conditions of active service.

5. The Beaten Zone.—(i) The area of ground beaten by a cone of fire is termed the "beaten zone." It is regarded as a plane surface. Fig. 6 illustrates this zone together with the additional space which would have to be taken into account in reckoning the dangerous space of the cone of fire in consequence of the height of the objective.

(ii) **Depth of Beaten Zone.**—The depth of the beaten zone

at short ranges need not be considered on account of the flatness of the trajectory, which insures that practically its whole extent from the firers to the target is swept by bullets. The depth of the beaten zone at various ranges with the Mark VI and Mark VII ammunition is as follows:

Distance.	Depth of Beaten Zone.	
	Mark VI.	Mark VII.
500 yards	220 yards	300 yards
1,000 ,,	120 ,,	180 ,,
1,500 ,,	100 ,,	120 ,,

(iii) It will be seen that up to 1,500 yards—when the ground is parallel to the line of sight—the depth of the beaten zone decreases with the range, on account of the increased angle of descent of the bullets. This shrinkage of the beaten zone does not of itself increase fire effect by the closer grouping of bullets, owing to the increased steepness of the angle of descent, which decreases dangerous space.

(iv) Beyond 1,500 yards it will be found that the depth of the beaten zone tends to increase in consequence of the influence of atmospheric conditions on the flight of the bullet, the increased effects of errors in aiming, and faults in the rifle and ammunition—all of which combine to increase the dispersion of fire. This increased dispersion does not of itself increase fire effect owing again to the greatly increased steepness of the angle of descent at longer ranges, which results in a correspondingly great decrease in dangerous space.

(v) **Lateral Dispersion.** — On the other hand, owing to faults in aiming, comparative invisibility of the target, inaccuracies in the rifle and ammunition, and atmospheric influences, the *lateral dispersion* of a cone of fire *increases as the range becomes greater.* With Mark VI ammunition, the dispersion of the best 75 per cent. of shots fired may be taken as 7 feet by 220 yards at 500 yards, 14 feet by 120 yards at 1,000 yards, and 22 feet by 100 yards at 1,500 yards.

6. Nucleus of Cone of Fire.—It is found that the bullets in a cone of fire *are not dispersed evenly over the surface of the beaten zone.* It is found that they are grouped in such a way *that the majority of the bullets fall in the general direction of the line of fire, that the density of the grouping decreases progressively from the centre to the extreme limits of the beaten zone, and that the bullets are collected most thickly near the point for which the sights were set.* This dense grouping is usually termed the nucleus of the cone of fire, and is regarded for purposes of comparison as including the best 50 shots per cent.

7. Zone of Effective Fire.—The area of ground beaten by the best 75 shots per cent. fired is termed the zone of effective fire, for it has been found by experiment that *useful results in battle can only be looked for when the target is within these limits.*

Section 13.—Searching.

1. Definition of Searching.—Searching is the term applied to collective fire when the depth of its dispersion over a beaten zone is increased by the use of combined sights as described in para. 4 of this section.

2. When Collective Fire is Effective.—As already stated, collective fire will not as a rule produce results commensurate with the amount of ammunition expended, or fulfil

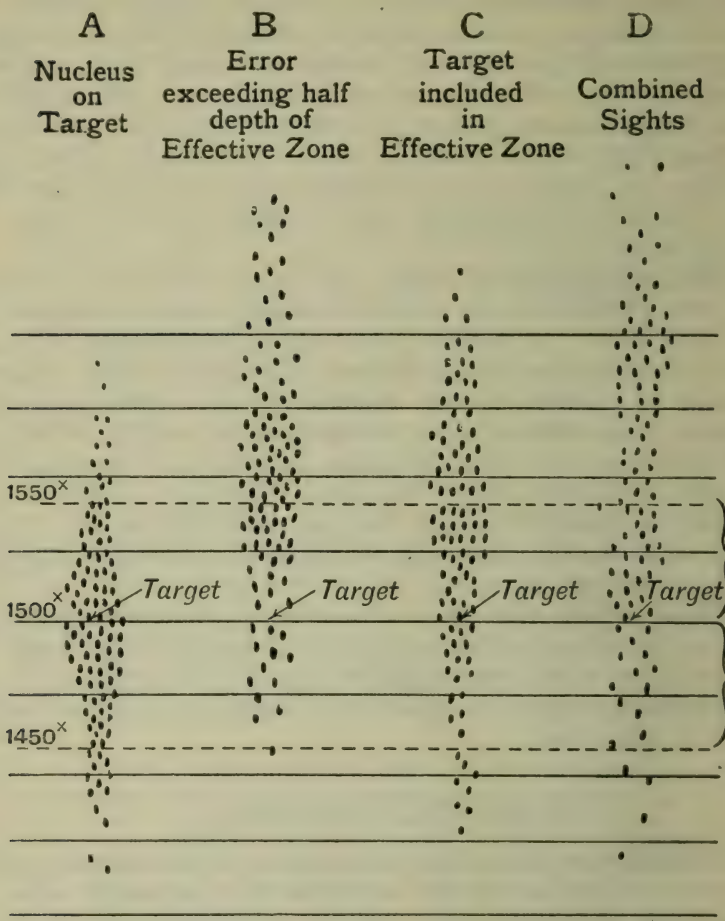


Fig. 7. DIAGRAMS ILLUSTRATING THE DISPERSION IN DEPTH OF CONCENTRATED COLLECTIVE FIRE AT 1,500 YARDS AND ITS DISTRIBUTION IN DEPTH BY THE USE OF COMBINED SIGHTS.

the purpose for which it is used unless the target is included within the area beaten by 75 per cent. of the bullets directed upon it—that is to say, unless it lies in the zone of effective fire (Fig. 7, C).

3. When Collective Fire is not Effective.—If an error in sighting is made which would result in the nucleus of the cone of fire striking at a distance short of or beyond the target which is *equal to half the depth measurement of the zone of effective fire*, the target will not be included in this zone, and the *fire will be ineffective* (Fig. 7, B).

4. When combined Sights are to be Used.—(i) Under service conditions it may be assumed that *even if the range is measured with the range-finder, the probability of error in ranging and judging atmospheric influences, known as the error of the day, is such that, at distances beyond* 1,000 *yards, collective fire concentrated on any target with one sigthing will probably be ineffective.*

(ii) To give a satisfactory degree of assurance of fire effect, it is advisable in such cases, *unless sighting can be corrected by observation of results*, to distribute fire in depth by using two elevations differing by 100 yards. One of these elevations would be 50 yards *over* and the other 50 yards *under* the sighting believed to be correct.

(iii) There will thus be two cones of fire and two beaten zones overlapping between the nucleus of each cone of fire, and an even distribution of fire will be obtained over a zone about 150 yards deep (Fig. 7, D). Thus, if one sighting had been used, as shown in Fig. 7, B, the fire would have been ineffective, though the grouping of bullets in the zone of effective fire would have been more dense, because the error in sighting would have had the result described in para. 3 above. By using combined sights fire becomes effective, because though the grouping of bullets is less dense fire is *distributed in depth* so as to avoid the result described in para. 3.

(iv) *Ordinarily fire should be closely concentrated with a view to observation of results, but if observation has failed, or if the situation calls for immediate application of effective fire, combined sights should be used at ranges beyond* 1,000 *yards.* Combined sights may sometimes be used to increase assurance of effect when the enemy's position is ill-defined, but should never be used if observation of results can be obtained. *Combined sights should not be employed by bodies of less than two platoons.*

Section **14.**—The Relation of Ground to Fire Effect.

1. So important is the influence exercised on fire effect by the shape of the ground in relation to the grouping of bullets, that it is essential for all officers and non-commissioned officers to understand thoroughly how the probability of fire effect is increased or diminished by the inclination of ground with reference to the trajectory.

2. In attack, such knowledge will assist them in *adopting formations and directing the fire of their men to the best advantage.* In defence, it will aid them *to select the best positions for fire action,* and will enable them to take steps to minimize the inherent disadvantages of these positions. In the following examples only *plane surfaces, without undulations or accidents, are considered.*

3. Level Ground.—As already stated, on level ground the zone beaten by collective rifle fire varies considerably with the range. The extent of this zone is further influenced by the *inclination of the ground to the line of sight.*

4. Rising Ground.—(i) The more steeply the ground rises with reference to the line of sight, the greater will be the decrease in the extent of the beaten zone. For example, when firing with Mark VI ammunition at ground rising 2, 5, and 10 degrees, the depth of the beaten zone at 1,500 yards range is decreased roughly by quarter, half, and

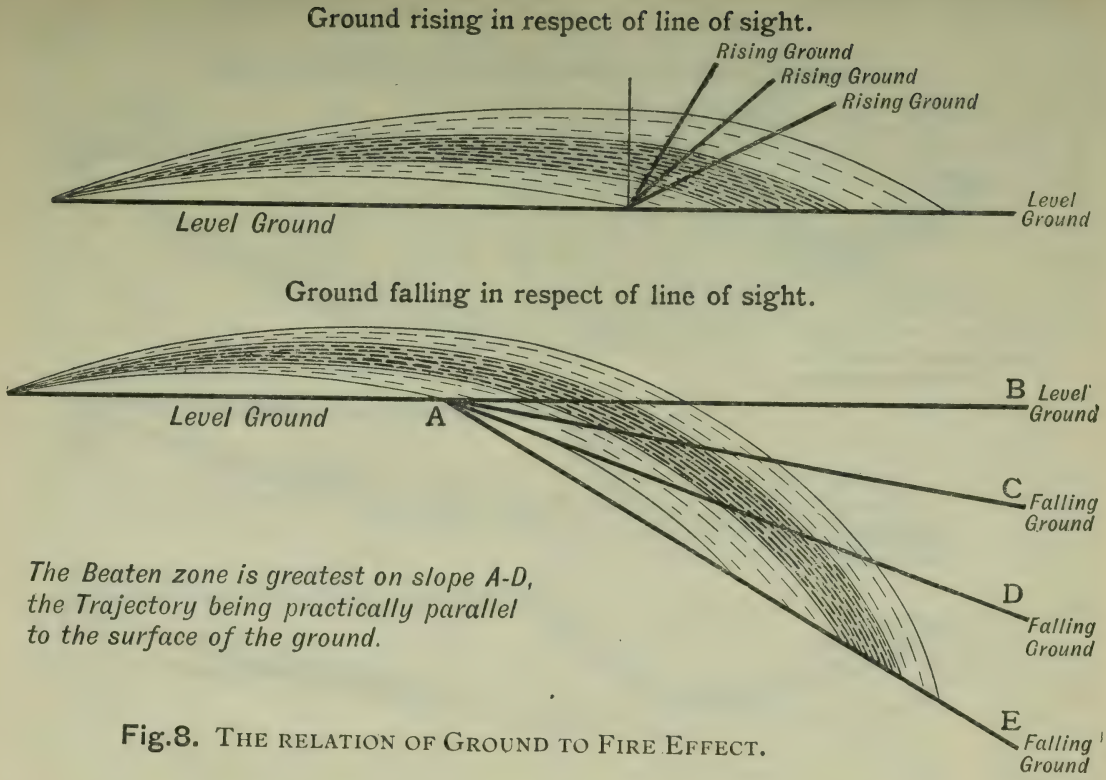

Ground rising in respect of line of sight.
Rising Ground
Rising Ground
Rising Ground
Level Ground
Level Ground
Ground falling in respect of line of sight.
Level Ground
A
B Level Ground
C Falling Ground
D Falling Ground
E Falling Ground
The Beaten zone is greatest on slope A-D, the Trajectory being practically parallel to the surface of the ground.

Fig.8. THE RELATION OF GROUND TO FIRE EFFECT.

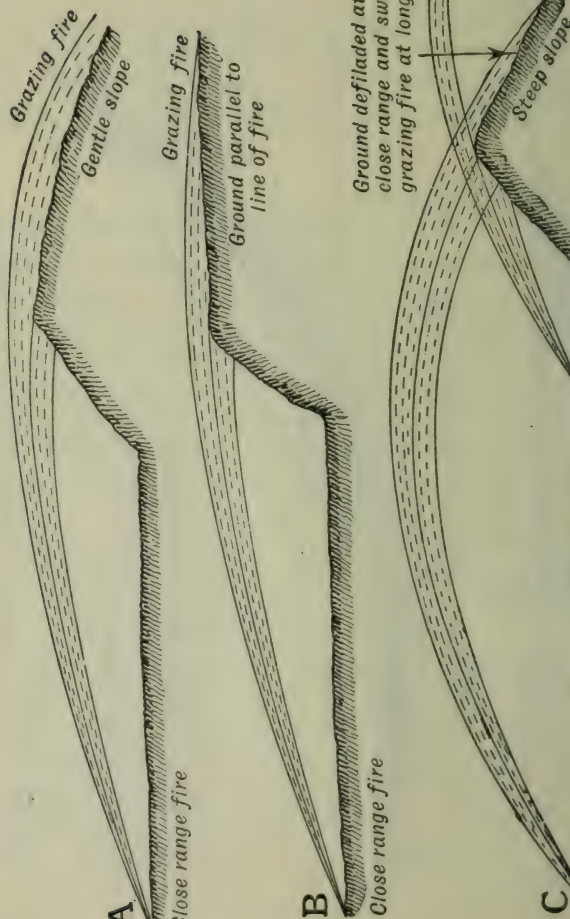


Fig. 9. THE RELATION OF GROUND TO FIRE EFFECT.

two-thirds respectively (Fig. 8). Since the grouping of the bullets becomes closer as the upward slope of the ground increases, the effect of errors in estimation of range will be more serious, and as the bullets will fall at a steep angle the dangerous space will be proportionately reduced.

(ii) **Formations, Supports, and Reserves.** — As a general rule, therefore, on ground which *rises* with reference to the line of sight, *troops should be drawn up in shallow formations, but supports and reserves may be nearer the firing-line than is normally advisable.*

5. Falling Ground.—(i) When the ground beaten by bullets *falls* in respect of the line of sight, *the depth of the beaten zone is augmented in proportion as the downward slope increases, until it reaches its greatest magnitude when the angle of the fall of the bullets is the same as the slope of the ground ;* or, in other words, when the trajectory is practically parallel to the ground surface (Fig. 8, Depth of Zone, A—D). In these circumstances the fire becomes *grazing* (Fig. 9), *and the extent of the dangerous space is nearly identical with the beaten zone.*

(ii) *At close ranges,* therefore, where the trajectories are flat, the depth of the beaten zone will be much increased if the ground behind the target *falls at a gentle slope* (Fig. 9, A). *At long ranges,* on the other hand, a greater area will be beaten when ground falls more steeply (Fig. 9, C).

(iii) For example, at 1,500 yards range the depth of the beaten zone is roughly increased by three-fifths when the bullets strike ground falling at 2 degrees. On ground falling at 5 degrees, which is nearly parallel to the trajectory at this range, the depth beaten is about ten times greater than on level ground.

(iv) It is clear, therefore, that falling ground *far behind the objective will at times be swept by unaimed fire,* and it follows that in such circumstances supports should either be under cover or, if there is no cover, in shallow columns

on narrow frontages with the object of reducing target surface as much as possible.

6. Crest Line. — (i) When the objective is a crest line the depth of the beaten zone is greatest, and part of the fire is grazing, when the ground beyond the crest is parallel, or nearly so, to the trajectory of the bullets (Fig. 9, A and B). At close ranges, in this case, there will be behind the crest-line a *defiladed zone, or space not swept by fire* (Fig. 9, C), greater or less according to the distance from which fire is delivered, the inclination of the line of sight, the extent of the hill top, and the inclination of the reverse slope.

(ii) **Position of Supports and Reserve.**—It appears, therefore, *that when the firing-line is placed on the crest of a razor-backed hill*, with steep reverse slopes (Fig. 9, C), supports and reserves will at all ranges be but little exposed to unaimed fire when posted in its vicinity. In other cases, when the crest of a hill is occupied, the vulnerability of supports and reserves will be least if, when the enemy is at long range, they are withdrawn from, and as he approached closed on, the firing-line (Fig. 9, C).

7. Dead Ground (Fig. 10).—Dead ground is ground on which, owing to its conformation or to the existence of natural or artificial cover, fire cannot be brought to bear from a given locality. The term is thus a relative one, for though an area of ground may be dead in relation to one locality it may be possible to bring fire to bear upon it from another locality, in relation to which it will not therefore be dead.

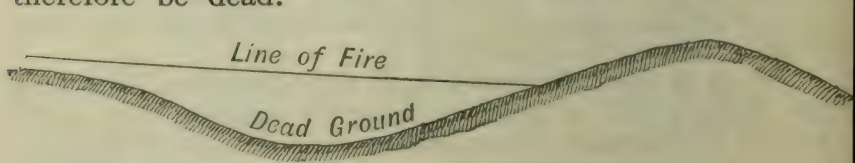


Fig. 10.—DEAD GROUND.

CHAPTER III

INSTRUCTION IN AIMING

Section 15.—General Remarks.

1. Principles of Instruction.—The instruction of recruits in aiming and firing should be carried out on a systematic method. The progression of training must in every case lead by gradual steps from simple to more difficult stages. Instructors must necessarily teach by explanation to some extent, but they must limit explanation to short and very clear statements, and rely chiefly upon practical demonstration for training their men. With regard to results they must aim at insuring *accuracy* in every stage of training before they permit men to attempt *rapidity*. Any sacrifice of accuracy for rapidity must be guarded against carefully and corrected at once. Short daily lectures, followed by questions to test the knowledge of men, should form part of the scheme of instruction.

2. Progression of Instruction in Aiming and Firing.—The progressive stages of instruction in aiming and firing are set out in a definite order in this and the following chapter which deal respectively with these subjects. Instructors, however, are not bound to follow this order, and may modify it at their discretion.

3. Concurrent Instruction in Aiming and Firing.—Aiming instruction should proceed simultaneously with firing instruction and muscle exercises to develop speed and facility in handling the rifle and steadiness in firing it. The following scheme of concurrent instruction in aiming and firing is suggested for the guidance of instructors, who may modify it at their discretion:

AIMING.	FIRING.
A.	A.
1. Aiming at bull's-eye target with the foresight and backsight.	1. Correct position for firing standing.
2. Explanation of trajectory and the need for elevation by sighting.	2. Practice in loading and unloading in standing position.
3. Laying an aim with Legret Aim-Teacher.*	3. Adjustment of sights and standard tests of same.
4. Rules of aiming.	4. Trigger-pressing and adjustment of sights with rifle rested.
5. Common faults in aiming and their results.	
6. Aiming at bull's-eye target from a rest.	
7. Test of aim by triangle of error.	
8. Aiming at figure targets and at ground.	
B.	B.
9. Aiming practice (*a*) at bull's-eye and (*b*) figure targets with (i) rifle rested, (ii) rifle unsupported.†	5. Practice in assuming the different firing positions with standard tests of same.
10. Test of aim by aiming-disc.	6. Practice in combining aiming with trigger-pressing.
11. Aiming and trigger-pressing combined, practised with eye-disc or aim-corrector.	7. Practice in muscle exercises in the standing and lying firing positions.
12. Practice in firing at bull's-eye target on miniature range and 30-yards range.	

* For description of and directions for use of Legret Aim-Teacher, the Aim-Corrector, and Aiming-Disc, see Appendix. A list of necessary appliances for aiming instruction, including aiming and firing rests, etc., will be found in para. 6 of this section.

† The position for aiming when lying will be taught previously to this practice.

AIMING (*continued*).

C.

13. Explain influence of side wind.

14. Explain aiming-off for wind, and wind table for 500 yards. Apply tests in aiming-off for wind.

15. Explain aiming-off for movement. Practise same on miniature range and check with aim-corrector.

D.

16. When accuracy in deliberate firing at elementary and service targets is assured, explain the nature and practical value in warfare of snapshooting and rapid firing.

17. Practise gradually quickening the aim with aiming-disc, and on miniature and 30-yard ranges. Apply grouping and application tests.

FIRING (*continued*).

C.

8. Practice kneeling and sitting firing positions, and taking cover in these positions.

D.

9. Practise firing over and round cover in various firing positions at elementary and service targets.

E.

18. When the recruit has shown proficiency in grouping, deliberate firing, and snapshooting, on the miniature, 30-yard, and open range, explain and practise adjusting long-range sights.

19. Practise aiming from a rest at figure targets and ground.

20. Practise snapshooting and rapid fire at figure targets and ground on miniature, 30-yard, and open range.

21. Practise aiming-off for movement at figure targets on miniature range.

Note.—(1) Ample time should be devoted to trigger-pressing and declaring the point of aim on discharge. This instruction may conveniently be given indoors.

(2) The aiming position should not be taught until aiming has been taught.

(3) Aiming and trigger-pressing should not be combined until trigger-pressing has been taught.

(4) The test for trigger-pressing should not be applied until after the lying position has been taught.

(5) The miniature range may be used when assurance of reasonable proficiency has been ascertained by means of the aiming discs.

(6) The 30 yards range with service ammunition may be used when the results on the miniature range are satisfactory.

(7) Grouping on the open range may be commenced when the recruit is able to make good groups on the 30-yards range.

4. Selecting Rifles for Recruits.—(i) Before the instruction of recruits in aiming and firing commences they must be fitted with rifles having long, normal, or short butts, according to the build and preference of the men. The choice should be made after tests carried out in the standing and lying positions, and should be based on the readiness with which the firer brings his rifle up to the firing position, and aligns his sights without letting his nose and mouth come into close proximity to the thumb and fingers of the right hand.

(ii) The principal consideration is *the distance of the nose from the shoulder*, and it is as a rule the broad-shouldered and long-necked men that require the long butts. A bad trigger release, due to incorrect holding of the small of the butt, will often result from the use of too short a butt. *The butt selected should be the shortest which can be used comfortably when firing, both standing and lying down, in the correct positions.* These rules for fitting rifles of course apply also to non-commissioned officers.

5. Sights.—Special care must be taken that *the sights of any rifle used in aiming instruction are in perfect order*, Instructors must inspect the sights frequently to insure that they are *correctly adjusted* in accordance with his orders.

6. Appliances for Aiming and Firing Instruction.—(i) The following appliances will be needed by instructors:

(*a*) Diagrams showing position of sights correctly and incorrectly aligned.
(*b*) The Legret aim-teacher.
(*c*) Aim-corrector.
(*d*) Aiming-disc.
(*e*) Aiming-rest.
(*f*) Firing-rest.
(*g*) Charger and dummy cartridges.
(*h*) Measuring rings [see Sec. 49, para. 6 (xi)].

Note.—*The method of using the aim-teacher, aim-corrector, and aiming disc, and grouping gauges is described in the Appendix. Aiming- and firing-rests are described in "Musketry Regulations," Part II.*

(ii) **Aiming Marks.**—(i) The aiming marks to be used in aiming instruction will consist of elementary bull's-eye targets for the early stage of instruction, and of a variety of figure targets similar to those used for firing practices for later stages.

(ii) When the habit of accuracy has been acquired in aiming at elementary targets, service targets will only be used and care will be taken that there is no falling off in accuracy owing to the shape and comparative invisibility of these targets. A list of figures for use on miniature ranges will be found in the Appendix, VII, para. 5.

Section 16.—Aiming Instruction.

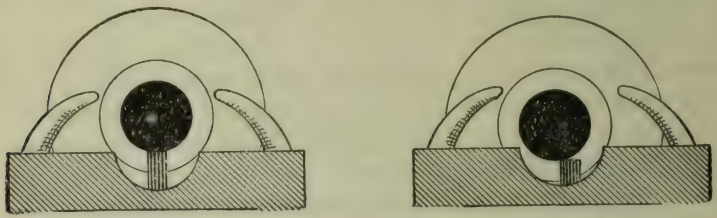
1. Rules for Aiming.—The instructor will explain the following rules, and demonstrate the results to be anticipated from common errors in aiming:

(i) The backsight must be kept upright.

(ii) The left or right eye, according to the shoulder from which the man shoots, must be closed.*

(iii) Aim must be taken by aligning the sights on the centre of the lowest part of the mark, the top of the foresight being in the centre of, and in line with, the shoulders of the **U** or **V** of the backsight (Fig. 11).

Note.—The low point of aim is essential in firing at service targets, as it facilitates a clear view of marks which are usually difficult to discern, and also because service targets are frequently in movement towards the firer, thus



Correct. Incorrect.

Fig. 11.—DIAGRAMS SHOWING CORRECT AND INCORRECT ALIGNMENT OF SIGHTS.

necessitating aiming down to alter elevation owing to their decreasing distance.

2. Method of Instruction.—(i) When these principles have been mastered, the instructor will loosen the sling of the rifle, adjust the sights for any given range, and aim from a rest at the target, taking care that *his eye is immediately above the butt-plate.* It will be convenient to use a sandbag aiming-rest to steady the head during the aiming.

(ii) Having aimed, he will make each recruit observe the correct method of aligning the sights on a mark. Each recruit in turn will then be made to align the sights on a

* Shooting from the left shoulder is not to be permitted unless it is rendered necessary by defective eyesight in the opinion of the Company Commander.

mark, after which the instructor will verify his aim, point out errors, and explain how they would have affected the accuracy of the shot, and how they are to be avoided. For example, Fig. 11 shows incorrect sighting, the rifle being inclined to the right, aimed to the right, and aimed too low, the top of the foresight being well below and to one side of, instead of in the centre of and in line with, the shoulders of the U of the backsight. The obvious result of these errors would be to fire low to the right of the mark.

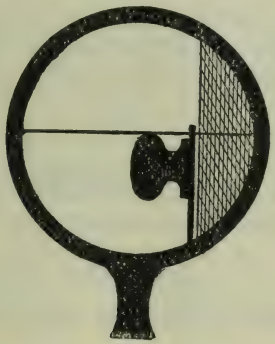


Fig. 12.—LONG-RANGE SIGHTS.

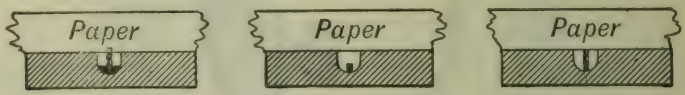
(iii) The instructor should also make recruits verify their comrades' aim under his supervision as above described, and point out any errors which may have been made. *Extreme accuracy of aim must be insisted on even during the first lesson.*

(iv) **Long-Range Sights.**—In aiming with the long-range sights a similar procedure to that which is described above will be pursued, but the eye will be placed *about* 1 *inch behind the small of the butt,* and the top of the head of the dial sight will be seen in the centre of the aperture (Fig. 12). *Unless special care is taken, lateral error will be made in centring the head of the dial sight.*

Section 17.—Common Faults in Aiming.

1. Taking too much or too little Foresight into the U or V of the Backsight.—(i) It should be explained that a fine or half sight will cause the bullet to strike with Mark VI ammunition about 5 inches and 3 inches lower respectively, and with Mark VII 7 inches and 4 inches lower respectively per 100 yards of range, than when the correct sight is taken.

(ii) The following method will be found useful to guide the soldier in taking the correct amount of foresight: Lay the edge of a piece of paper on the upper edge of the backsight



Incorrect: Too much foresight. | Incorrect: Too little foresight. | Correct.

Fig. 13.—FAULTS IN AIMING.

cap, when the sight will appear as shown in one of the subjoined diagrams. A piece of cardboard laid on the cap and held in place by an elastic band will answer the same purpose.

2. Inaccurate Centring of the Foresight in the Notch of the Backsight.—The soldier should understand that this inaccuracy will deflect the muzzle of the rifle to the side on which the line of aim is taken. For example, if aim be taken over the right edge of the notch the direction of the line of fire will be to the right of the line of sight.

3. Inclining the Backsight to one Side.—In this case the bullet will strike low and to the side towards which the sights are inclined. The resulting error will be considerable at long ranges.

4. Fixing the Eyes on the Foresight and not on the Object.—(i) If the eye is focussed on the foresight, the firer *will retain only a blurred image of the target.* This may not affect the result of his shooting at the distinct stationary bull's-eye target, but when firing at troops in neutral-tinted uniforms, whether stationary or in movement, or at natural features of ground, *it is essential for fire effect that the eye should be focussed not on the foresight, but on the target, which must be watched closely while firing.**

(ii) Unless service targets are closely watched while aiming, the firer will be apt to lose them altogether, or see them as a blurred image at the moment of firing, with consequent loss of fire effect. For this reason it is of great importance that recruits should, from the earliest stage of their training, be taught to aim at service targets *with the eye focussed on the target,* and not on the foresight. If early stages of instruction were confined to the aiming at the bull's-eye target, the fault of focussing the eye on the foresight in aiming might be contracted owing to the distinct nature of this mark, which makes it possible to aim at it with the eye fixed on the foresight. (See Appendix, VII., para. 2.)

Section **18**.—Triangle of Error.

1. The following method of recording a triangle of error will be employed to test proficiency in aiming, and to demonstrate the errors which will arise from inaccuracies.

2. The rifle will be placed on an aiming-rest, and pointed at a sheet of blank white paper, fixed to any convenient object at a distance of about 10 yards from the muzzle. A second aiming-rest should be used to steady the head in aiming.

* See Fig. 33 illustrating this point. See also *Drill and Field Training* of this series, Fig. 41, and *Field Entrenchments* of this series, Figs. 67 and 68.

3. A marker will hold an aiming-disc flat on the paper, the front facing the instructor. The instructor will align the sights on it correctly, and its position on the paper will then be marked by a dot made with a pencil passed through the hole in its centre.

4. Each man in succession will then be called up and ordered to look along the sights, but without touching the rifle, and when he has satisfied himself as to the correctness of the aim, the disc will be removed. It will then be replaced on the paper as before, and moved at his direction until the lower edge of the bull's-eye is brought into the line of sight, when its position will be marked as before. This

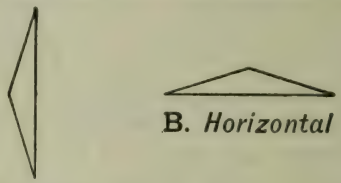


Fig. 14.—TRIANGLE OF ERROR

operation will be repeated three times in the case of each man, and the points thus fixed will be joined in such a way as to form a triangle.

5. The position of these points in relation to the *instructor's aim* will expose any constant error in aiming. If the recruit's aim is below that of the instructor, it shows that he has taken too full a sight; if above, that his sighting has been too fine; if to the right, that the foresight was on the left of a perpendicular drawn through the centre of the notch; if to the left, *vice versa*.

6. The position of the points in regard *to one another* will show *inconsistency*. If the triangle is formed so that its greatest side lies vertically on the paper, it proves that the soldier's principal fault is inconsistency in respect of

the amount of foresight taken up into the line of sight (Fig. 14, A); if the greatest side of the triangle lies horizontally it shows that his principal error is *inaccurate centring of the foresight* (Fig. 14, B).

7. If any one of the sides of the triangle exceeds $\frac{1}{3}$ inch from the instructor's aim, the recruit will be noted for further instruction.

8. Aim-Corrector.—The aim-corrector will also be used to enable the instructor to supervise the soldier's methods and test his progress, the aim being taken from an aiming or firing rest.

Section 19.—Aiming at Service Targets, Aiming at Ground, and Marking Down the Enemy.

1. Aiming at Service Targets.—From an early stage in his instruction the soldier's eye must be trained to discern and aim at service targets. Elementary instruction may be carried out in barracks, on the range, on ground in the vicinity of barracks, or on miniature ranges. Figures should be used representing men in the various firing positions at different distances in the open, or partly behind cover.

2. Aiming at Ground.—(i) Service targets will frequently consist of ground or cover occupied by the enemy. Fire-unit commanders will verbally indicate such targets to men, who must be trained to recognize and fire at them. This training should be carried out concurrently with instruction in aiming at figures and marking down the enemy—the latter practices to some extent will also train men to aim at ground.

(ii) Practice in aiming at ground may be carried out on miniature ranges, as described in Sec. 72, para. 2 (i), as well as in open country. It must always be carried out under practical conditions, and will include aiming at various ill-

defined targets, such as a spot on a bare hillside or a stretch of grass-land. Targets will be indicated verbally by the instructor, and recruits will aim at them with rifles on aiming-rests. The instructor will then criticize each man's aim and correct faults. Practice in aiming at ground will prove a useful preparation for training in recognition of targets (Sec. 45) and fire discipline (Sec. 47).

3. Marking down the Enemy.—(i) It is of the utmost importance that soldiers should be trained to mark down the exact position of an enemy seen to occupy ground or cover. This duty refers equally to individual enemies at close range and to hostile troops at longer ranges. Individual soldiers will mark down the enemy within close range, and fire-unit commanders and observers at longer ranges. If the position marked down affords concealment from view without protection from fire, fire may be opened after the range has been ascertained or estimated. If it affords protection from fire, the range should be ascertained or estimated, and fire-units or individual men should remain ready to open fire the instant the enemy exposes himself or resumes movement. Delay in opening fire in the latter case will lead to the loss of a favourable opportunity (see Practices, Nos. 3 and 4, pp. 217, 218).

(ii) **Method of Instruction.**—Instruction will best be carried out on the ground or on the miniature range as described in Chapter X. When carried out on the ground a fatigue-man will be sent out to the front, and directed to move from cover to cover to the front of the class which will be provided with rifles on aiming-rests. At each halt, when the fatigue-man has taken cover, recruits will note the point on the ground or cover which conceals him, and take aim at it. After an arranged interval the fatigue-man will expose himself to view, and remain stationary while the instructor criticizes each man's aim and corrects faults.

Section 20.—Aiming-Off for Wind.

1. The Wind-Gauge.—*The use of the wind-gauge is not the normal means of making allowance for wind under service conditions.*

2. Judging Strength and Direction of Wind.—The soldier should be taught to discriminate between mild, fresh, and strong winds, or winds blowing ten, twenty, or thirty miles an hour. The strength of the wind may be judged partly by sensation and partly by its effect on natural objects, such as clouds, water, trees, crops, hedges, bushes, undergrowth, dust, and smoke. The soldier may judge the direction of the wind, as front, rear, side, or oblique, by turning his face fully towards the wind.

3. Wind Deflection Table for Side Winds (Right-Angle Winds).—The following figures give the approximate deflection of the bullet due to winds of varying direction and velocity at different ranges, and provide a rough guide for aiming-off for wind which is sufficiently accurate for practical purposes:

Range.	Strength of Wind.		
	Mild. Miles per hour, 10.	Fresh. Miles per hour, 20.	Strong. Miles per hour, 30.
	Deflection.	Deflection.	Deflection.
500 yards	2 feet	4 feet	6 feet
1,000 ,,	3 yards	6 yards	9 yards
1,500 ,,	6 ,,	12 ,,	18 ,,
2,000 ,,	12 ,,	24 ,,	36 ,,

Note—Oblique Winds.—For oblique winds the approximate deflection at the above ranges may roughly be estimated as *half that of a side wind of the same velocity* and allowance in aiming-off may be made accordingly.

4. Exercises in Aiming-Off.—(i) Having memorized the approximate allowances for side and oblique winds of varying direction and velocity, as stated in para. 3, the recruit will next be taught to make allowance in aiming-off for wind at a full-length figure target on the range, according to the strength and direction of the wind which is actually blowing, or which may be supposed to be blowing, as given by the instructor. In carrying out these exercises the recruit should be taught to aim-off with reference to the breadth of a full-length figure target, which is rather less than 2 feet wide. Thus the amount of allowance will be measured as one breadth, two breadths, etc., to right or left.

5. Orders for Aiming-Off.—Finally, the recruit must be exercised in aiming-off at all ranges according to orders, the amount of allowance being given as so many times the breadth of the target indicated, or so many times the width of the intervals between targets consisting of close formations. The amount of allowance may also be indicated by the use of auxiliary aiming or description points (Sec. 45), as, for instance, a tree or bush, the lateral distance of which from the target equals approximately the required allowance. When none of these methods of indicating allowances are possible men must be taught to aim-off so many feet or yards to the right or left of the target, these measurements being taken as representing the lateral distance between the sight of the rifle and the target aimed at.

6. Method of Indicating Errors.—In aiming-off exercises it is necessary to employ a fatigue-man at the target to indicate the correct point of aim with a marking-disc *after* each aim taken by the recruit, which to commence with should be done with a rifle on an aiming-rest. He will

carry out the duty according to previous instructions as to the correct point of aim for each exercise. The amount of allowance made by the recruit will be observed by the instructor with an aim-corrector, unless an aiming-rest is used. The recruit will be made to note his errors, which will be criticized by the instructor.

7. Instruction on Miniature Ranges.—Instruction in aiming-off can be carried out on miniature ranges, as described in Chapter X (see Practice No. 2, p. 227).

Section 21.—Aiming Up and Down.

1. When to Aim Up and Down.—The rifle will be aimed up or down to increase or reduce elevation at all ranges when there is no time to alter sights, as, for example, in firing at targets in movement, in repulsing a charge at close range, in case of surprise, when very slight alterations of elevation are seen to be necessary, as the result of observation of fire, and to avoid frequent small changes of sighting which lead to loss of fire effect. *Correction of sighting in individual firing at close range is seldom possible in war. Therefore aiming up and down is the normal means of altering elevation in firing at targets within close range.*

2. Rules for Aiming Up and Down.—There is no fixed rule for aiming up and down. As a general rule aim should be directed at a point not more than 3 feet above or below the six o'clock line, according to the position of the target beyond or short of the zone for which the sights are set. The degree of allowance in aiming up and down will depend on the rate and direction of movement and the range of the target, and will be a matter for individual judgment. *If the difference between the range and the sighting exceeds* 200 *yards it will be best to alter the sighting.*

3. Exercises in Aiming Up and Down.—To practise aiming up and down, under conditions approximating to those of

service, the sights should first be fixed for a given range, and then fatigue-men or standing-figure disappearing targets disposed at various ranges should be alternately brought into view for short periods of time, representing troops in movement. Men should be told whether targets represent retreating or advancing troops, and aim up or down accordingly. Aim may be criticized by using aiming-rests or aim-correctors.

Section **22**.—Aiming-Off for Movement.

1. Instruction.—Instruction in aiming at moving targets will be carried out during the latter portion of preliminary training. It will consist of practice in shooting at crossing targets on 30 yards or miniature ranges (see Chapter X). The pace of movement should be regulated as far as possible in strict accordance with that of service targets (see Practice No. 2, p. 217).

2. Crossing Targets.—This term is applied to targets moving across the front of the firer, either at right angles from either side, or obliquely towards or away from him to either side. Such targets are not as a rule met with in battle except in the case of surprise, ambush, or a sudden encounter. Crossing targets may be met with by cavalry and infantry patrols, and by scouts during reconnaissance. *Fire will rarely be effective at a single man moving across the front at more than* 300 *yards range, or at a single horseman beyond* 500 *yards.*

3. Method of Aiming at Crossing Targets.—(i) When firing at crossing targets aim will first be taken on the object. Then, following it sideways, the aim will be carried in advance of the object, and kept in front of it at the desired distance until the rifle has been fired. The distance to which aim should be carried in advance of the target will vary according to the range, rate of movement, direction of movement and wind. For this reason no fixed rules can be

laid down regarding aiming-off in firing at crossing targets. Fire effect will depend upon the judgment of individual men and fire-unit commanders, and on the fruits of practical experience.

4. Rules for Aiming-Off for Movement—(i) **Targets crossing Front at Right-Angles.**—The following general rules will serve as a guide in firing at crossing targets at close range *moving at right-angles across the firer's front.*

(*a*) Up to 500 yards range, aim should be taken—

About 1 foot in front per 100 yards at a single man walking.
About 2 feet in front per 100 yards at a single man doubling.
About 3 feet in front per 100 yards at a single horseman trotting.
About 4 feet in front per 100 yards at a single horseman galloping.

Thus, at 100 yards a soldier should aim about the breadth of a man in front of an individual walking, and at 200 yards about a horse-length in front of a single horseman trotting.

(*b*) Beyond close range aim should be taken *at the head of a body of troops moving to a flank.*

(ii) **Targets crossing Front Obliquely.**—The general rules regarding aiming up and down laid down in Sec. 21, para. 2, apply also to crossing targets moving obliquely towards or away from the firer. *In firing at such targets, allowance must be made for elevation as well as for aiming-off.* At short range both allowances will be made by individual men. At longer ranges men will allow for aiming up and down, and when necessary fire-unit commanders will allow for aiming-off in fire orders.

(iii) **Targets moving directly Towards or Away from the Firer.**—In aiming at an object moving *directly* towards or away from the firer, allowance for elevation will usually be made *by aiming up or down*—not by waiting to alter sights (Sec. 21, paras. 1 and 2).

Section 23.—Practice in Rapid Adjustment of Sights.*

1. This instruction should be carried out concurrently with instruction in loading in the various firing positions. Frequent small changes of sighting lead as a rule to loss of fire effect, and may be avoided by aiming up or down. *But when there is time the sights will be adjusted for every alteration in the range, and aim will be taken at the lowest part of the mark.* It is essential that men should be trained to adjust their sights accurately and rapidly, and that this power should become to all intents and purposes instinctive, so that this vitally important duty on which fire effect in a large measure depends will be carried out by the soldier with certainty in moments of the most extreme stress and excitement.

2. Training in Rapid Adjustment.—Instructors will frequently test their squads in setting their sights rapidly and accurately. They will give orders for aiming or firing at definite targets, but without naming the range, and require their squads to adjust their sights before they bring the rifle to the shoulder, judging the distance for themselves, which will help to make the careful adjustment of sights, which is essential for fire effect, habitual to the soldier. Adjustment of sights will also be practised under the same conditions in connection with the movement of the firer or the target, represented by fatigue-men.

3. Rules for Adjusting Sights.—(i) **To Adjust the Backsight.**—Hold the rifle in the loading position (Sec. 27), so that the lines on the backsight can be seen clearly. Press in the stud (or studs) on the side of the slide with the left or right hand; move the slide until the line is even with the

* For directions for adjusting sights in the lying position, see Sec. 26, para. 4 (iv).

place on the leaf giving the elevation for the distance named, taking care that it is firmly fixed. *Charger-Loading Lee-Enfield Rifle.*—Loosen the clamping screw with the thumb and forefinger of the right hand, move the slide until the top is even with the line on the leaf giving the elevation for the distance named, and then tighten the clamping-screw.

(ii) **To Lower the Backsight.**—Press the stud or studs inwards with the left or right hand, and draw the slide backwards as far as possible. *Charger-Loading Lee-Enfield Rifle.*—Loosen the clamping-screw, lower the slide to the bottom of the leaf with the firefinger and thumb of the right hand, then tighten the clamping-screw.

(iii) **Fine Adjustment of the Backsight.** — (*a*) *S.M.L.E. Rifle, Marks III and IV.*—Press the stud on the slide with the thumb of the left hand till the worm-wheel can be easily revolved; turn the worm-wheel with the thumb-nail of the right hand until the required elevation is obtained. The stud must not be pressed to such an extent that the worm-wheel is entirely disengaged from the rack.

(*b*) *Other Marks.*—Turn the fine adjustment screw with the forefinger and thumb of the right hand until the line on the leaf is level with the line on the fine adjustment scale giving the required elevation.

(iv) **To Adjust the Long-Range Sights.**—Hold the rifle in the loading position, so that the dial can be seen clearly. Move the pointer to the place on the dial giving the elevation for the distance named, and then raise the aperture sight.

CHAPTER IV

ELEMENTARY INSTRUCTION IN FIRING

Section 24.—Hints to Instructors.

1. INSTRUCTORS will teach by force of example rather than by word of mouth, and be careful to refrain from any form of comment which may discourage young soldiers. Words of command are seldom required except in collective firing instruction, all motions of firing being performed independently, and each man being required to use his own judgment as much as possible. Faults must not, however, be overlooked or allowed to become formed habits. *The essential points of the firing positions are to be insisted upon from the beginning, as the foundation of fire discipline.*

2. In the early part of training squads will not as a rule consist of more than seven men, who will be assembled round the instructor in a semicircle. The instructor will explain the uses of the different firing positions and illustrate them to the squad. Recruits will practise the motions separately until able to combine them, and *assume each position rapidly and without constraint.*

3. The position of each individual will be corrected in turn. The regulation positions may be varied if physical characteristics render them unsuitable in any case, but awkwardness in the first stages of instruction will not be accepted as an indication that the regulation position requires modification. The instructor should stand about five paces from the recruit and to his right front while correcting his faults.

4. The firing-rest will be employed frequently in early instruction to enable the recruit to support the rifle and

rest his muscles, whilst the instructor modifies, or corrects, his position. An incorrect position, however, usually arises from want of accuracy in the preliminary actions which lead to it, and it is to these that attention must be given, for a faulty position once acquired cannot easily be corrected.

5. With regard to the firing positions, the standing position is a convenient one to commence elementary instruction. When recruits have acquired facility in handling the rifle, they will be trained for the most part in the lying position, either in the open or behind cover, and occasionally in the kneeling position behind cover.

6. Progression of Training.—Elementary instruction in firing will be divided into the following stages:

(i) Trigger-pressing from aiming-rest.
(ii) Snapping from aiming-rest.
(iii) Assuming the various firing positions.
(iv) Loading and unloading in the various firing positions.
(v) Aiming and firing in the various firing positions in the open, including loading, adjusting sights, and unloading.
(vi) As in (v), with the various firing positions adapted to different forms of cover.
(vii) Muscle exercises.

Section 25.—Trigger-Pressing and Snapping.

1. Importance of Trigger-Pressing.—(i) Instruction in firing will commence with training in pressing the trigger. The vital importance of performing this action correctly must be impressed upon recruits. They must understand that, however carefully and accurately the rifle is aimed, accurate shooting is impossible if trigger-pressing is faulty, as aim will be disturbed at the moment of discharge. Faultless trigger-pressing is absolutely essential for accurate firing.

2. Need for Mental Effort.—Trigger-pressing requires most careful individual instruction, during which the necessity for determination and strong personal effort of will will be impressed on the mind of every recruit. The power of concentrating the mind and controlling the nerves and muscles by exercising the will are all developed by practice in trigger-pressing, and these qualities of character are essential for good shooting and for fire discipline.

3. Rules for Trigger-Pressing.—(i) The trigger of the S.M.L.E. rifle has a double pull-off, and two distinct pressures are necessary to fire the rifle. The first pull should be taken

Fig. 15.—Method of Pressing Trigger with Forefinger.

when the rifle has been brought into position for aiming; the second when the sights are aligned on the mark. The charger-loading Lee-Enfield rifle has a single pull-off.

(ii) The direction of the pull-off is diagonally across the small of the butt. The first joint of the forefinger should be placed round the *lower* part of the trigger (Fig. 15). In order not to disturb the aim *breathing must be restrained when pressing the trigger. In firing the trigger must be pressed so as to release the cocking-piece without disturbing aim.*

(iii) To do this *a gradually increasing pressure* must be exerted on the trigger until the spring is released. Such pressure will be facilitated if the grip of the trigger hand on the rifle is strengthened slightly, as though to oppose the inward pressure of the trigger finger with an equal gradual counter-pressure. This will give the whole action the effect of a squeeze with the hand, of which the pressure of the trigger finger is the most important part—the part on which the mind must be concentrated. *On no account*

must the pressure of the finger in any degree take the form of a pull or jerk.

(iv) Fig. 16 shows the results of faulty trigger-pressing in firing. The trigger has been pulled or jerked to the left instead of being properly pressed, and the grouping of shots —low to the right—shows how aim has been disturbed in consequence.

4. Method of Instruction.—(i) The rifle will be rested on sandbags (Fig. 17), or an aiming-rest, and the recruit will

Fig. 16.—Shot Group illustrating Result of Faulty Trigger-Pressing.

be seated with his elbows rested on a table. The instructor will first see that the recruit can *move his trigger-finger independently of the remainder of the hand and arm,* if necessary, by making him practise this action.

(ii) In order that he may learn from experience the pressure required to release the cocking-piece, the soldier in commencing instruction in trigger-pressing, will be directed to place his forefinger under that of the instructor, but without exercising pressure, whilst the instructor

carries out the motion (Fig. 18). Then, to enable the instructor to ascertain whether the method is understood, the soldier will place his finger over that of the instructor, and exert the pressure. Finally, the soldier will himself press the trigger, while the instructor uses the aim-corrector to see that aim is not disturbed when the trigger is pressed. Special care will be taken that the *breathing is restrained while pressing the trigger. The use of the sling for steadying the rifle during firing is not to be taught.*

5. Declaring the Point of Aim.—The recruit must always be made to say after the spring is released whether the aim was maintained truly at the moment of snapping. If not, he must state definitely the direction in which the rifle was pointed at the moment of discharge. By this means recruits will find out and correct their own faults, and the contraction of bad habits will be avoided.

6. Tests of Trigger-Pressing and Snapping.—From time to time the instructor will test the aim and steadiness of each recruit in trigger-pressing and snapping with an aim-corrector or an aiming-disc (Fig. 19). If necessary, further lessons in trigger-pressing will be given. Progress should also be tested from time to time by grouping practice on the miniature range or 30 yards range. These practices will help to develop steadiness until range practice is begun. Daily practice in snapping is necessary for trained soldiers as well as for recruits.

Section 26.—The Various Firing Positions.

1. Vulnerability of Different Firing Positions.—In the open up to 1,000 yards the lying position will usually prove the least vulnerable to the effects of both rifle and artillery fire, as it is the most difficult to discern and exposes the smallest surface to fire. As a rule, the lying position is also the least vulnerable to the effects of rifle fire at

Fig. 17.—Showing Grip of Right Hand, and Trigger Finger.

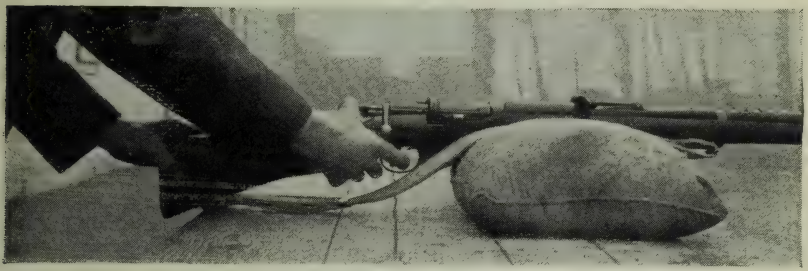


Fig. 18.—Instructor Illustrating Correct Method of Pressing the Trigger.

Fig. 19.—Correct Method of Using Aiming-Disc.
(*See Appendix, Sec. IV., "Aiming-Disc."*)

To face p. 66.

Fig. 20.—Standing Position—Side View.

Points to note:

1. Body well balanced.
2. Left elbow well under rifle.
3. Good bed for the butt.
4. Firm grip with both hands.
5. Eye well back from the cocking-piece.
6. Sights perfectly upright.

Fig. 21.—Standing Position—Front View.

Points to note

1. Body well balanced.
2. Left elbow well under rifle.
3. Good bed for the butt.
4. Firm grip with both hands.
5. Eye well back from the cocking-piece.
6. Sights perfectly upright.

To face p. 67.

all ranges. On the other hand, it is more vulnerable to the effects of shrapnel in the open than the kneeling or sitting positions. The use of entrenchments, however, whenever possible, usually obviates the necessity for assuming the lying position in the open in attacking a strongly-held defensive position.

2. Need for Avoiding Unnecessary Movement.—Recruits will be trained to assume the various firing positions rapidly, and to perform the loading and aiming motions with as little movement as possible. All unnecessary movement in performing these motions must be avoided, especially in the open, as movement attracts the eye and tends to betray the position of targets which, when stationary, would be invisible or extremely difficult to discern.

3. Standing Position (Figs. 20 and 21).—(i) The standing position will, as a rule, be used on service to fire from breast-works, high walls, and cover, such as long grass or standing corn, or to take a snap-shot when advancing, so that the pace of the advance is not materially checked. For the height over which a man can fire standing see Sec. 31, para. 2.

(ii) **Rules for the Standing Position.**—Body turned half right, left foot carried to the left and slightly forward, so that the body is erect and well-balanced, left elbow well under the rifle, the butt well into the hollow of the shoulder, rifle gripped firmly with both hands, eye well back from the cocking-piece, sights perfectly upright.

4. Lying Position (Fig. 22).—(i) The lying position will generally be adopted by troops on open ground, or when firing from continuous low cover, or from behind small rocks, trees, etc. Preliminary instruction in firing and firing exercises will, as a rule, be carried out in the lying position as being the most convenient.

(ii) Other conditions being equal, this position has the advantage that its use in firing results in a greater extent

of dangerous space than in the case of other firing positions [Sec. 9, para. 2 (ii)].

(iii) **Rules for Firing in the Lying Position.**—Turn half right, bring the rifle to the right side as when standing, holding it in the left hand. Place the right hand on the ground, and lie down on the stomach with the legs separated, left shoulder well forward, left arm extended to the front, and rifle resting in the left hand in a convenient position, muzzle pointing to the front and clear of mud or dust on the ground. The line of the body may be slightly oblique to the line of fire, *but this oblique angle must not be exaggerated, as it will tend to increase vulnerability by presenting a greater surface to the enemy's fire than when the body is parallel to the line of fire* (see Fig. 30).

(iv) **Adjusting Sights.**—To adjust sights in the lying position draw the rifle back with the left hand until the lines on the backsight can be seen clearly. In the case of S.M.L.E. and Charger-loading Lee-Enfield rifles, draw the rifle back through the left hand.

(v) **Height of Rifle above Ground.**—For the height over which a man in the lying position can fire see Sec. 31, para. 2. If it is necessary for improving the field of fire and obtaining better fire effect to increase the height of the body above ground, this can be done by raising it on the elbows and at the same time slightly retiring it.

5. Kneeling Position (Figs. 23 and 24).—(i) The kneeling position is used mainly when firing from continuous cover, such as a low wall, bank, or hedge, or in long grass, crops, etc., which would obstruct the line of sight if the prone position were adopted. For the height over which a man in the kneeling position can fire see Sec. 31, para. 2.

(ii) **Rules for Firing in the Kneeling Position.**—The soldier may kneel on either or both knees. When kneeling on one knee the body may be supported on the heel, or not, as desired. The left knee will be in advance of the left heel, and the left

Fig. 22.—Prone Position—Side View.

Points to note:

1. Body oblique to line of fire.
2. Legs separated.
3. Heels on ground.
4. Good bed for the butt.
5. Firm grip with both hands.
6. Eye well back from the cocking-piece.
7. Sights perfectly upright.

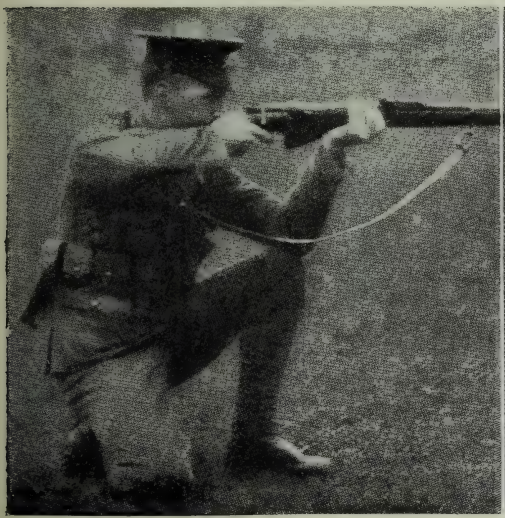


Fig. 23.—Kneeling Position—Side View.

Points to note:

1. Body well balanced.
2. Left elbow well under rifle.
3. Good bed for the butt.
4. Firm grip with both hands.
5. Eye well back from the cocking-piece.
6. Sights perfectly upright.
7. Left heel slightly behind left knee.

Fig. 24.—Kneeling Position—Front View.

Points to note:

1. Body well balanced.
2. Left elbow well under rifle.
3. Good bed for the butt.
4. Firm grip with both hands.
5. Eye well back from the cocking-piece.
6. Sights perfectly upright.
7. Left knee, forearm, rifle, and right shoulder, in one vertical

Fig. 25.—SITTING.

Fig. 26.—SITTING POSITION WHEN FIRING—AIMING DOWN STEEP SLOPE.

elbow will rest on or over the left knee. The left leg, hand, and arm, and the right shoulder, should be in the same vertical plane when firing in the open kneeling on the right knee. When kneeling on both knees, the body may rest on both heels, or be kept upright to suit the height of the cover, the elbows in both instances being unsupported by the body.

6. Sitting Position (Figs. 25 and 26).—The sitting position will be the most suitable when on ground falling at a steep slope. In this position the right shoulder should be kept well back, the left forearm supported by the thigh, and the right elbow resting against the right knee, or unsupported, as desired.

Section **27.**—Loading and Unloading.

1. To Load (Fig. 27).*—(i) Bring the rifle to the right side in front of the hip, with the muzzle pointing upwards, small of the butt just in front of the hip, grasping the stock with the left hand immediately in front of the magazine. Turn the safety-catch completely over to the front with the thumb or forefinger of the right hand. (*Charger-loading Lee-Enfield Rifle.*—Lower the safety-catch with the thumb of the right hand.)

(ii) Pull out the cut-off if closed, first pressing it downwards with the thumb, then seize the knob with the forefinger and thumb of the right hand, turn it sharply upwards, and draw back the bolt to its full extent.

(iii) Take the charger between the thumb and first two fingers of the right hand, and place it vertically in the guides. Then, placing the ball of the thumb immediately in front of the charger, and hooking the forefinger under

* The command *Load* is only required for drill purposes, or when charging rifles before leaving quarters on service. It is not used in fire orders.

the cut-off, force the cartridges down with a firm and continuous pressure until the top cartridge has engaged in the magazine. Force the bolt sharply home, turning the knob well down, and, with the thumb or forefinger of the right hand, turn the safety-catch completely over to the rear. (*Charger-loading Lee-Enfield Rifle.*—Raise the safety-catch with the forefinger of the right hand.) Then button the pouch, seize the rifle with the right hand in front of the left, bring the left foot back to the right and order arms.

(iv) **Loading the Magazine.**—The magazine will hold two charges of five cartridges each, but should in ordinary circumstances be loaded with one only, as the soldier will thus retain the power of adding another charge at any time should necessity demand. If, when on the line of march, it is desired to charge the magazine without loading the rifle, the top cartridge may be pressed downwards with the thumb and the cut-off closed. *After the rifle is once charged the soldier is responsible that his magazine is refilled at once whenever it has been emptied.*

4. To Unload.—Carry out the directions in para. 1 (i) and (ii), but after drawing back the bolt, without turning the knob down, work the bolt rapidly backwards and forwards until the cartridges are removed from the magazine and chamber, allowing them to fall on the ground. Then close the breech, press the trigger, close the cut-off by placing the right hand over the bolt and pressing the cut-off inwards, apply the safety-catch, lower the backsight or the long-range sights, and order arms.

5. Rapid Loading.—(i) When he is able to aim and fire steadily in all positions and from various classes of cover, the soldier will be exercised in combining rapid loading with the greatest rapidity of aim consistent with accuracy. Rapid loading will first be practised separately, using dummy cartridges in chargers. When five rounds have been inserted in the magazine, the bolt will be closed and

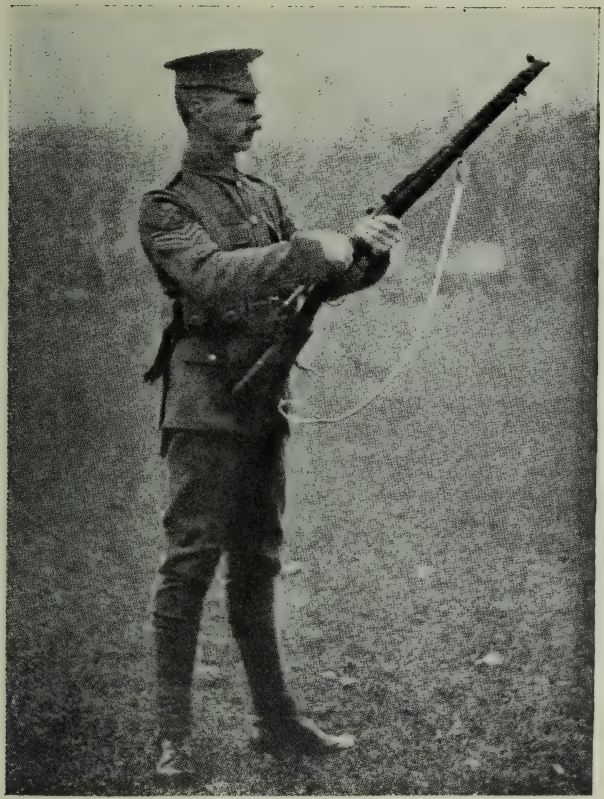


Fig. 27.—Loading in Standing Position.

Points to note :

1. Body erect and well balanced.
2. Left elbow close to body.
3. Firm grip with left hand, close in front of magazine.
4. Muzzle pointing upwards.
5. Butt well forward.
6. Forefinger of the right hand under the cut-off.
7. Eyes on the mark.

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Fig. 28.—Firing in the Open. Heads lowered; Observer watching Front.

To face p. 71.

turned over, and the rifle will at once be unloaded and another charger inserted similarly. Rapid loading should be practised in all positions, but especially in the lying position.

(ii) **Rapid Firing.**—The rate of firing should be increased gradually, provided that faults of aiming and trigger-pressing are not acquired. Short bursts of rapid fire only will be permitted, the firing being carefully regulated and controlled. A target will always be indicated.

6. Caution.—Before dummy cartridges are used on parade, special precautions will be taken to insure that neither ball nor blank ammunition is taken to the parade ground. *The instructor will personally examine all cartridges, rifles, pouches, and bandoliers, before loading takes place.*

Section **28.**—Use of the Safety-Catch and Cut-Off.

1. Troops armed with rifles fitted with safety-catches will invariably set the catch to safety before movement. The use of the cut-off is to be confined in their case to occasions when they are not actually engaged with the enemy. Then it may be employed for the purpose either of charging the magazine without inserting a cartridge in the chamber, or to unload the rifle while retaining cartridges in the magazine.

2. The cut-off is never to be used to enable the rifle to be used as a single loader, and is not to supersede the use of the safety-catch. In the case of rifles which have no safety-catches, the cut-off will be pressed in and the rifle unloaded on all occasions when the safety-catch is ordered to be applied in these instructions. In an advance in extended order, however, these rifles may be carried during movement at the slope instead of being unloaded.

Section **29**.—Instruction in Aiming and Firing.

1. Rules for Aiming and Firing.—(i) The rules for taking accurate aim have already been stated. In combining aiming with the movements for firing in the various firing positions the following rules will be observed:

(ii) Direct the eyes on the mark. Then bring the rifle into the hollow of the right shoulder, and press it in with the left hand, grasp the small firmly with the thumb and three fingers of the right hand, place the forefinger round the lower part of the trigger, and exert sufficient pressure to take the pull. In making these motions, the backsight will be kept upright, the left elbow brought well under the rifle, and the right elbow brought a little lower than and well to the front of the right shoulder.

(iii) As the rifle touches the shoulder, bring the cheek down on the butt, keeping the face well back from the right hand and cocking-piece, close the left eye, align the sights on the mark, *restrain the breathing*, and press the trigger.

(iv) *Great care must be exercised to insure that the forefinger is not placed on the trigger before the rifle is in contact with the shoulder, and that a firm grip is maintained with both hands while firing. Unless the butt rests firmly in the hollow of the shoulder, accurate shooting is impossible.*

(v) *The further the eye is kept from the backsight the more clearly will the sights be defined, the less strained will be the position of the head and neck, and the less will be the effect of recoil.*

2. Aiming and Firing Practices.—In aiming and firing practices, the firer should always declare the direction of his aim at the moment of discharge before removing the rifle from the shoulder for the reasons given in Sec. 25, para. 5. The instructor will carefully supervise practices, and will test the accuracy of aiming with the aim-

corrector or aiming-disc. Having carried out the motions described in paras. (ii) and (iii) above, the recruit after a pause will bring the rifle to the loading position, and practise the motions again, or he will apply the safety catch and order arms, according to the orders of the instructor.

Section **30**.—Firing in the Open.

1. The need for avoiding unnecessary movements in assuming the various firing positions in loading and aiming will have been impressed upon recruits during their instruction in the firing positions and loading. Recruits must be taught that it is especially important to avoid these unnecessary movements when firing in the open [Sec. 72, para. 3 (iii)]. *In firing in the open, the head should be lowered in the intervals of firing, but the ground in front must be watched by selected observers* (Fig. 28).

2. Positions in the Open.—Besides avoiding movements betraying their position, recruits will be taught to select positions in the open so as to avoid as far as possible backgrounds which increase their visibility [Sec. 72, para. 4 (ii)]. They will be taught, as part of their instruction in visual training, to note the effect of different backgrounds upon the visibility of service targets. They will learn that concealment may be possible even in the open without cover, for troops at longer ranges when not in movement may be invisible to the naked eye. Individual men, when motionless in the open, may also be invisible to the naked eye within close range.

Section **31**.—Firing from Cover.

1. Instruction in the choice and use of ground and its natural or other features as cover for concealment or protection from the enemy's fire, and in adapting the different firing positions to various forms of cover, will be part of the field

training of men at a stage which will combine training in fire discipline and manœuvre (see Chapters III. and VI. of *Drill and Field Training* of this series). Full directions regarding the choice and use of the ground and its existing features as cover are contained in Sec. 33* of *Drill and Field Training* of this series. Training in the construction and use of hasty fire-cover, and more elaborate forms of constructed cover, such as various field entrenchments, are dealt with in *Field Entrenchments* of this series, which also deals with the preparation of doors, windows, and buildings, as well as banks, ditches, etc., to serve as cover. Training in firing in the different firing positions from behind various common forms of cover will form part of the elementary instruction of recruits in firing.

2. Height of Cover for Use in Different Firing Positions.—The heights over which a man of average stature can fire on level ground in the various firing positions are as follows: Lying, 1 foot; kneeling, 3 feet; standing, 4 feet 6 inches. On level ground a man can fire over about five-sixths of his own height. Higher cover can be used when firing uphill than when firing downhill.

3. Rules for Firing from Cover.—(i) Instructors must impress on recruits that the most important requirement in firing from cover is *the ability of a man to use his rifle to the best advantage, and that the eyes must be kept on the enemy between shots* to avoid losing sight of targets. In using cover, the recruit must be taught to keep as near to the cover as possible, compatible with ease in firing. He must also be taught when possible to fire round the side of cover rather than over it.

* The advantages and disadvantages of different forms of cover, such as hedges, banks, walls, ridges, folds of ground, bushes and undergrowth, knolls and small hollows, buildings and enclosed spaces, rocks, mounds of earth, skyline and continuous cover running diagonally to the line of advance, or which runs or zigzags across the line of advance, are discussed in this section.

Fig. 29.—Firing round Cover—Correct.

Fig. 30.—Firing round Cover– Unnecessary Exposure.

Fig. 31.—Firing from Fold of Ground—Side View.

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Fig. 32.—Firing from Fold of Ground—Unnecessary Exposure.

Fig. 33.—Firing from Fold of Ground—Correct Method.

Fig. 34.—Firing over Continuous Cover.

Waiting to Fire. Centre, correct position; right and left, incorrect positions—unnecessary exposure.

To face p. 75.

(ii) **Adapting Firing Positions to Different Forms of Cover.**—The following notes and illustrations lay down general rules as to the correct method of adapting the different firing positions to various forms of cover commonly found in the field.

(iii) **Isolated Cover.**—Figs. 29 and 30 illustrate the correct and incorrect methods of using isolated cover. Fig. 29 shows the minimum exposure, the whole body being protected by cover. Fig. 30 shows unnecessary exposure of the head and body, and also of the legs, owing to the extreme oblique angle of the body to the line of fire. As a rule isolated cover should be avoided even if it affords protection from fire, as in the case of occasional rocks or small mounds of earth, especially at close ranges, because men, if seen occupying such cover, can easily be marked down by the enemy, and hit on leaving it. Rocks may also be dangerous, owing to the risk of injury from splinters.

(iv) **Continuous Cover** — (*a*) *Ridges and Folds of Ground.*—Figs. 31, 32, and 33 show correct and incorrect methods of using ridges and folds of ground as cover. These features commonly provide good cover, especially the latter, which may be difficult to recognize from a distance. If properly used, they may afford concealment and protection from the enemy's fire, for which as a rule they do not offer well-defined targets. For instance, the fold of ground in Fig. 33 would be invisible if it were not indicated by the men's heads.

(*b*) *Low Cover.*—Figs. 34 to 38 show the correct and incorrect methods of using low cover. Figs. 39 to 42 show correct and incorrect methods of using higher forms of continuous cover, such as stone and brick walls, banks, etc. As a rule these forms of cover, whether consisting of hedges, with or without ditches, banks, or walls, have the disadvantage of offering well-defined targets to the enemy's fire and may, in addition, obstruct the advance of troops occupying them. Stone and brick cover, in addition, involves the

risk of injury through splinters or demolition if subject to artillery fire.

4. Method of Instruction.—(i) Instruction should be carried out under practical conditions. If necessary, different forms of cover can be improvised by the use of sandbags, hurdles, boxes, etc. The instructor will give practical illustrations of the correct method of adapting the different firing positions to various forms of cover. He will then order each man to adapt the different firing positions to cover, and criticize faults, or call on other recruits in the class to criticize them.

(ii) When recruits have progressed sufficiently, they should be sent out to the front of the class as fatigue-men to make use of various forms of cover, such as folds of ground, hedges, ditches, walls, trees, isolated bushes, undergrowth, tufts of grass, etc., in advancing towards the class. Besides taking cover, they should go through the loading and aiming motions as though firing at the class.

(iii) The instructor will make use of these object-lessons to point out the advantages and disadvantages of various forms of cover, the correct and incorrect methods of using cover, and the danger of exaggerated or unnecessary movement of the head, arms, or rifle in loading and aiming which tend to betray the position of men or make them easy to mark down. This instruction can be carried out on miniature ranges according to the directions laid down in Chapter X., Sec. 72, para. 3 (iv).

5. Rules for Selecting Cover.—The following general rules will help to guide soldiers in selecting cover. They must remember that in the field the selection of cover may often involve a choice between alternative disadvantages. It may not be possible to avoid bad cover or to find good cover, and it may sometimes be better to use bad cover than to remain in the open. Soldiers, therefore, must be taught in the course of their field training to make the best use of ground and cover under the varying conditions of each tactical situation.

Fig. 35.—FIRING OVER CONTINUOUS COVER.

Correct and incorrect prone position for loading and waiting to fire. The unnecessary exposure and movements of the rifle of the man on the right are wrong.

Fig. 36.—FIRING OVER CONTINUOUS COVER.

Correct and incorrect prone positions. Unnecessary exposure of man on right.

To face p. 76.

Fig. 37.—Firing round Continuous Cover: Lying Position—Front View.

Fig. 38.—Firing round Continuous Cover: Lying Position—Side View.

Fig. 39.—KNEELING BEHIND COVER—POSITION WHEN LOADING.

Points to note:

1. No undue exposure.
2. Watching front.
3. Trigger guard downwards to facilitate loading and sight-setting.
4. Muzzle clear of cover.

Fig. 40.—KNEELING BEHIND COVER—POSITION WHEN LOADED.

Points to note:

1. No undue exposure.
2. Watching front.
3. Trigger guard outwards.

Fig. 41.—KNEELING BEHIND COVER—POSITION WHEN FIRING.

Points to note

1. No undue exposure.
2. Body well balanced.
3. Left elbow well under rifle.
4. Good bed for the butt.
5. Firm grip with both hands.

Fig. 42.—KNEELING BEHIND COVER—POSITION WHEN FIRING.

6. Eye well back from the cocking-piece.
7. Sights perfectly upright.
8. Rifle, but not hand, resting on cover.
9. Position adapted to the cover.

To face p. 77

(i) **Good Cover.**—Perfect cover—which, however, will very rarely be found—will combine the following advantages:

(*a*) Affords a clear view up to the enemy's position.
(*b*) Permits the free use of the rifle.
(*c*) Gives concealment to the firer.
(*d*) Provides protection for him against the enemy's fire without hindering forward movement.

(ii) **Bad Cover** involves any of the following disadvantages:

(*a*) Offers a well-defined target for the enemy's fire, and provides no protection from its effects.
(*b*) Gives a restricted view of the enemy's position.
(*c*) Restricts the free use of the rifle.
(*d*) Obstructs the advance of troops occupying it in attack.

(iii) **Dangerous Cover.**—Features of ground which offer clearly defined targets for the enemy's fire, and afford no protection from its effects, are dangerous cover if occupied in view of the enemy, especially if they run parallel to his position. Common examples of such features are an isolated hedge or the edge of a wood.

6. Penetration of the Pointed Bullet.—A table will be found in the Appendix to *Field Entrenchments* of this series giving the approximate penetration of the pointed bullet when firing at various substances. In order to obtain bullet-proof cover, an extra thickness of substance must be added to these measurements of penetration. Earth should not be less than $3\frac{1}{2}$ feet thick to afford bullet-proof cover. If the soil is free from stones, a thickness of 4 feet is desirable. *This thickness may roughly be measured with a service rifle,* 3 *feet* $8\frac{1}{2}$ *inches long.*

Section 32.—Muscle Exercises.

1. (i) To accustom the muscles to the strain of prolonged firing the following exercises will be performed daily during

the elementary training of recruits, and frequently by trained soldiers. Care must be taken that men are not unduly fatigued by the exercises, and that they do not commence them when they are tired. In each practice, a conspicuous object, representing the target, will be indicated, and the rifle will invariably be thrown into approximate alignment with it.

(ii) In the first and third exercises the correct aiming position will be assumed, including taking the pull, bringing the cheek on to the butt, and closing the left eye, but without actually aligning the sights. In the second exercise the first pull will be taken when the right hand grasps the rifle, but the head will not be lowered, the left eye will not be closed, nor will the sights be aligned.

2. First Practice.—To be performed with and without bayonet fixed. Caution:—*Muscle Exercise. First Practice.* Commands:—*Standing or Lying—Load.*

One.—Bring the rifle to the position for aiming, return at once to the position for loading, and continue the practice.

Unload.

3. Second Practice.—Caution:—*Muscle Exercise. Second Practice.* Commands:—*Standing or Lying—Load.*

One.—Bring the rifle to the position for aiming.

Two.—Quit the rifle with the right hand.

Three.—Seize the rifle with the right hand, and at the same time quit it with the left hand.

Unload.

Note.—The words *Two* and *Three* will be given at intervals of about 10 seconds. The trigger will not be pressed when in the third position.

4. Third Practice.—To be performed with and without bayonet fixed. Caution:—*Muscle Exercise. Third Practice.* Commands:—*Standing or Lying—Load.*

One.—Bring the rifle to the position for aiming.
Unload.

Note.—The men will be trained progressively to hold the rifle in this position until they can do so without fatigue for two minutes.

5. Cadet Muscle Exercises.—(i) In the case of Cadets, the above muscle exercises may be carried out with a light rifle. Alternatively the special exercises for Cadets suggested in the following paragraph may be carried out in preference to the second and third Regulation muscle exercises, the strain of which may develop slowness of movement in young, growing lads by making the muscular tissues heavy rather than well-toned. Moreover, the repetition of these exercises is monotonous, and may cause a distaste for them in youths. Cadet muscle exercises which consist of going through the various movements of assuming the different firing positions, loading, sighting, *aiming*, and pressing the trigger, are therefore suggested as a substitute for the Regulation muscle exercises. The introduction of aiming at a mark—preferably a service target—in the course of muscle exercises will help to develop the muscles of the eye, together with those of the body and limbs.

(ii) These exercises have the advantages of occupying the mind of the cadet while exercising his muscles, and so diverting attention from the mere repetition of continued muscular effort, which is wearisome. They avoid the heavy strain of the third Regulation musketry exercise, and attain the object of the second—namely, to develop a firm grip of the hand on the weapon, which is essential to service shooting, while practising cadets in seizing the weapon quickly in the proper places. They further embrace all the muscles used in the act of firing by including the firing positions and trigger-pressing instead of those

used in taking aim alone, and at the same time co-ordinate them into the quick, active movements essential for snap-shooting and rapid firing.

(iii) Cadets must not be practised at these exercises till they have been trained to perform correctly the various movements necessary for assuming the different firing positions, loading, sighting, bringing the rifle to the shoulder for aim, and pressing the trigger. They may be exercised in squads, but the instructor must supervise the work of each cadet, and be careful to see that all the separate movements combined in each exercise are carried out correctly, without being slurred or wrongly made.

(iv) The instructor must also be careful to see that no cadet continues any muscle exercise until he is fatigued. The exercises must be light at first, and gradually increased according to the strength of individual cadets as their muscles grow stronger. Exercises will be carried out under the control of the instructor and according to his directions. Each exercise will be carried out in a series of three movements, which may be repeated for a number of times at his discretion.

(v) **Cadet Muscle Exercise.** — Caution: — *Muscle Exercise.* Commands:—*Firing Position. Rate of Fire.*

One.—Assume the firing position ordered, and bring the rifle to the position for loading.

Two.—Perform the action of loading and adjusting sights correctly to a given range.

Three.—Bring the rifle to the position for aiming, press the trigger, and return at once to the position for loading.

Note.—Rapid loading and unloading in the prone position with the rifle to the shoulder will also prove a useful muscle exercise.

CHAPTER V

VISUAL TRAINING AND RANGING

Section 33.—General Remarks on Visual Training.*

1. Importance of Visual Training.—Great as is the loss of fire effect due to errors in judging distance and sighting, an even greater amount of ammunition will be expended without good results unless the soldier is trained to discern and select targets at close ranges, and to recognize targets described to him at longer ranges.

2. Even at close range, in the open, service targets consisting of troops are often impossible to discern with the naked eye when motionless if their background harmonizes with their uniform. At all ranges, except short distances within close range, troops in neutral-tinted uniform, adopting formations which allow full use to be made of ground and cover, are usually difficult to discern with the naked eye even when in motion.

3. Finally, targets which consist of ground or its natural features are not easy to recognize unless the eye of the soldier is specially trained for this work, upon which fire effect in battle beyond close range will depend. The eyesight of the soldier must, therefore, be developed in special powers to enable him to discern and recognize the targets of the modern battlefield at all ranges before he is able to fire at them effectively.

* Instructions for training both the eyesight and hearing for use by night are contained in Sec. 41 of *Drill and Field Training* of this series.

4. Scope of Training.—(i) Visual training will include discernment of targets, study and description of ground, recognition of and aiming at targets described by word of mouth, judging distance by eye, and, when possible, observation of the results of fire. Visual training should at first be separated from training in judging distance, but as proficiency is attained both should be combined after men have been instructed in military vocabulary and study of ground, which lays the foundation of instruction in recognition of targets. Training in observation of results of fire by watching the strike of bullets on the ground will be difficult to carry out except on dusty soil.

5. Visual Training on Miniature Ranges.—Directions for training men in the different subjects of instruction mentioned in the above paragraph, including observation of fire, are contained in Chapter X, Sec. 72, para. 4.

Section **34.**—Discernment of Targets.

1. Elementary Training.—Training will begin with questions framed to develop a man's powers of discerning objects, *and describing accurately and shortly what he sees.* At first any ordinary objects in the vicinity of barracks will be counted, or instruction may be carried out as in the elementary stage of training in observation and memory according to the directions laid down in Sec. 45 of *Drill and Field Training* of this series.

2. Training on the Ground.—Training will then be carried out on the ground. Exercises should first be carried out in good light, the recruits being allowed to stand and obtain a good field of view. Afterwards exercises should be carried out under all conditions of light, and in cloudy or misty weather, men being trained to discern and describe objects in the prone position in the open or behind cover, when their field of view will be restricted.

3. Visibility of Distinct and Neutral Colours.—For exercises in the field a certain number of dummy targets or fatigue-men will be placed or posted beforehand in various selected positions unknown to the class in the open, or partly behind cover, and against different backgrounds. The targets should include both the distinct bull's-eye and service figure targets of different colours, and the fatigue-men should be dressed in uniforms of both distinct and neutral tints, with the object of showing the difference in visibility of distinct and neutral colours against the same background. Neutral-tinted targets should also be arranged against various backgrounds to show how background affects visibility, as, for example, the difference in visibility of a khaki uniform against a white wall, a sheet of water, a skyline, dark ploughland, a green field, a brown hedge.

4. Effect of Background on Visibility.—During these exercises opportunity will be taken by instructors to utilize the useful object-lessons they provide upon the use of ground and cover. Men should be made to note the varying visibility of objects according to their background. They should be taught that the visibility of targets naturally tends to increase the effect of fire directed at them by facilitating discernment, judging distance, and aiming, while the vulnerability of targets is decreased in proportion as they are invisible or difficult to discern. Men must, therefore, be taught to note the effect of different backgrounds upon the visibility of fatigue-men in service uniforms. When being trained in the use of ground and cover, they should learn, when possible, to avoid positions such as a skyline or a background which contrasts sharply with their uniforms, and may render them distinctly visible to the enemy [Sec. 72, para. 4 (ii)].

5. Describing Targets.—In all exercises men will be given a definite period of time—which may be decreased as progress is made—in which to locate and count targets.

Each man should then be asked how many he has discerned. Men will in turn be asked to describe clearly and shortly the nature and position of any target they have discerned which has not already been described by a comrade. They should be taught to use military vocabulary in describing targets, and to indicate their position by the methods explained in Sec. 45. Visual training will thus lay the foundation of instruction in recognition of targets.

6. Use of Field-Glasses.—In the case of targets which are difficult to see, and which have not been discerned, the instructor may allow men to discern the target with the aid of field-glasses, and then make them try to discern the target with the naked eye, using natural features of the ground in the vicinity of the target to locate its position. This instruction will help to train men in the use of field-glasses and in recognition of targets.

7. Effect of Movement on Visibility.—Finally, fatigue-men will be employed to skirmish from cover to cover, and to perform the firing motions from behind cover, in order to show how motion catches the eye and exposes the firer's position (Sec. 72, para. 3 [iii]).

8. Locating an Enemy by Sound.—Blank ammunition will be used to give practice to the ear in locating an enemy by sound.

Section 35.—Military Vocabulary and Study of Ground.*

1. Importance of Military Vocabulary.—(i) Soldiers must be trained not only to discern, but to describe service targets of various kinds. For this purpose they must be instructed in military vocabulary. Military vocabulary comprises the technical terms applied to the organization, weapons, equipment, formations, and duties of various arms. Definitions of these technical terms are contained in

* See also Sec 72, para. 5.

the various books of this series, including *Drill and Field Training*, *Field Entrenchments*, and *First Aid*.

(ii) In this book, besides definitions of the technical terms which apply especially to musketry, a list of terms and definitions applied to natural and other features of ground and country is included on p. xxvi as being a necessary part of the military vocabulary used in the recognition and indication of targets.

2. Need of a Standard Vocabulary.—It is important that the military vocabulary in each unit of an army, and, if possible, in the whole army, should be uniform as to its various terms, especially in regard to the indication and description of targets. Both fire-unit commanders and men should therefore be thoroughly trained in applying a uniform military vocabulary correctly to various service targets, such as units of various arms in different formations and to the different natural and other features of ground and country.

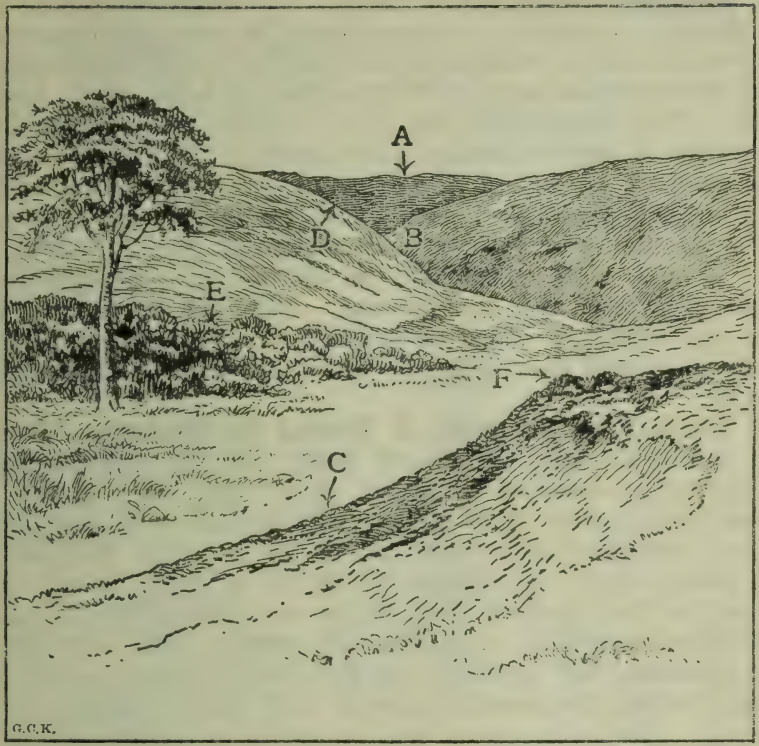
3. Method of Instruction.—(i) Instruction in military vocabulary may be carried out in the following manner. In early lessons the instructor will describe in detail simple prominent features, such as part of a skyline or the line of a bank or hedge, and get each man in the class to describe in similar terms another part of the line. He will then practise them by the same method in describing more difficult and extensive features. In this way men will gradually learn the correct terms to apply to a great variety of natural features of ground. When men have learnt how to describe various features of ground in correct terms, the instructor will proceed to describe small areas of ground, the limits of which he will first clearly define.

(ii) He will describe the shape and nature of the ground, as, for instance, whether it is level, undulating or broken, and rocky, sandy, or pasture. He will then describe its

various natural and artificial features, the different kinds of trees, fences, undergrowth, etc., on it, and the shape and size of the fields, with the colour of the earth or of crops growing in them. The approximate measurements of objects, roughly estimated, may also be given, as, for instance, whether they are large, small, of moderate size, tall, short, wide, or narrow. These rough measurements will often help to distinguish objects, such as trees, fields, hedges, or houses from one or more objects of a similar nature. Men will first be thoroughly practised in completing the description of ground and its features commenced by the instructor, and then, as progress is made in describing ground which is merely pointed out by the instructor without being partly described by him. Fig. 43 illustrates common features of ground which may be described in the manner outlined in these paragraphs.

4. Study of Ground.—It is clear that instruction in military vocabulary provides a good opportunity for training fire-unit commanders and men in the study of ground, which is of the greatest military importance. Therefore, in training men in the description of ground, instructors should also train them *to recognize all features of military importance*, such as good defensive positions, good lines of approach, good halting-places for attack, covered approaches, dead ground, obstacles, and good or dangerous cover.* When men have learned to recognize features of military importance, the instructor will indicate an area of ground, and question the class in turn as to what military features may be seen on it. Men must describe these military features in the correct terms, and they will thus learn an extremely important branch of military vocabulary—namely, that applied to ground—which must

* Military features of importance in connection with ground and cover are dealt with in *Drill and Field Training* and *Field Entrenchments* of this series.



A. *Skyline*
B. *Hollow*
C. *Gentle slope*
D. *Steep slope*
E. *Dense cover*
F. *Crest of Hill*

Fig. 43.—MILITARY VOCABULARY—TERMS DESCRIBING COMMON FEATURES OF GROUND.

frequently be described to them and recognized by them as aiming points in a later stage of their training.

5. Studying Ground from Cover.—As progress is made in the study of ground, the class should be made to examine the ground and to describe it from behind cover to accustom them to its appearance, as they will see it when firing from cover. This instruction will form a useful preparation for the duties of reconnaissance and scouting. When the class is sufficiently advanced, the areas of ground described will be increased gradually, and, when necessary, these areas will be divided into sectors, as described in Sec. 42, paras. 3 and 5, and each sector will be divided into foreground, middle distance, and background. Men will be trained to note the different zones of ground to which these terms are applied, and then to apply them correctly in describing ground.

6. Committing Features of Ground to Memory.—When men are sufficiently advanced, they may be practised in examining ground for a limited time, and then giving a correct description of its prominent features and principal military features with their backs to it. The instructor will check their description while it is being given by looking at the ground, and bring out points which may have been missed or forgotten by asking men questions. This practice will develop the extremely useful power of rapidly noting features of ground, and also of memorizing ground. The latter power will be useful in reconnaissance, scouting, and reports.

7. Study of Ground in Strange Country.—As the ground and its features, both natural and artificial, together with the names by which they are called, differ considerably in different countries, men should be trained in military vocabulary, the description and study of ground both before and during military operations in unfamiliar country.

Section **36**.—General Remarks on Ranging.

1. Importance of Ranging.—(i) Accurate ranging when firing is of vital importance, especially at distances beyond close range. Mistakes in judging distance or range-finding, and errors in sighting, cause a greater loss of fire effect than personal errors in shooting except at close range. But even within close range mistakes of more than 100 yards are not infrequently made in judging distance. *The more accurate the firing, the less will be the result if the sighting is incorrect from any cause.*

(ii) The measurement of ranges will commence the moment a firing-point has been chosen. Range-taking increases in importance rapidly with every 100 yards beyond 600 yards up to 2,000 yards, at which distance troops not in a close formation are only visible when in motion, or with a very favourable background or light.

2. Methods of Ranging.—(i) The principal means of ranging are—(*a*) Judging distance by eye; (*b*) observation of fire; (*c*) use of instruments such as the mekometer and the one-man range-finder. There are several auxiliary methods of ranging such as back-reckoning, use of maps, information obtained from aircraft, artillery or machine-guns, sound and flash, cross-bearings, etc., which may be used occasionally or in exceptional cases.

(ii) Observation of fire, when possible, is an effective means of ranging. If uncertainty exists as to elevation, it is better to underestimate than to overestimate the range. If it is necessary to fire at ranges beyond 1,000 yards, and observation is not possible, or the situation demands that some effect should be produced, quickly combined sights may be employed. In all cases every available means should be employed to find correct ranges. *No available*

means of ascertaining ranges should ever be neglected, if time and opportunity allow them to be used.

3. Reconnaissance as an Aid to Ranging.—As already stated, range-finding will as a rule be in progress before fire is opened, and the rapid reconnaissance of any ground on which a fire-fight is likely to take place should provide information of the greatest value to company officers responsible for the direction of fire. In preparing a defensive position, there is usually ample time for ascertaining ranges, and for using range-marks (Sec. 40, para. 5) and preparing range-cards (Sec. 40, para. 1).

4. Training of Officers and N.C.O.'s.—As fire is controlled at longer ranges, practice in judging distance is more necessary for officers and non-commissioned officers than for the private soldier. Soldiers who show aptitude in judging short distances by eye should, however, be given training with their leaders at judging longer distances. These men may also be selected for training in the use of range-finding instruments and in the duties of observers (Sec. 42, para. 9).

5. Reduction of Errors by Training.—Officers and non-commissioned officers, by constant practice, will reduce their mean error in judging distance from about 20 per cent. of the correct distance to about 10 per cent., but much depends on the local conditions to which the observer is accustomed. With thorough training the mean error of private soldiers in judging distances within 800 yards should not exceed 100 yards. Special attention should be paid to men whose mean errors exceed this distance, with a view to discovering the cause and reducing the error.

6. Effect of Strange Conditions.—Serious errors must be expected in judging under strange conditions of ground and atmosphere. Exercises in judging distance must therefore be carried out before, as well as during, military operations in unfamiliar country.

Section 37.—Judging Distances by Eye.

1. Methods of Judging Distance by Eye.—Distances may be judged by eye in the following ways: (*a*) By measuring the intervening ground with the eye in terms of some familiar unit, such as 100 yards; (*b*) by the apparent size of the object, if its size is known, or, in other words, by visual angles; (*c*) by the visibility of the object as affected by light, atmospheric effect, background, etc.

2. Rules for Judging Distance by Eye.—(i) The varying nature of the ground and its features, together with different conditions of light and atmosphere, affect general impressions of distance as measured by the eye by making objects look smaller or larger, and so making them seem nearer or further away from an observer than they actually are.

(ii) **Conditions which appear to Increase Distance.**—Objects will appear smaller, and therefore farther away than they are, under the following conditions:

(*a*) When objects are of the same colour or a colour which harmonizes with their background.
(*b*) On broken ground.
(*c*) When seen across a valley or undulating ground.
(*d*) In avenues, long streets, or ravines.
(*e*) When in shadow.
(*f*) When viewed in mist or failing light.
(*g*) When heat is rising from the ground.
(*h*) When seen near any other object which makes it appear smaller than it is by the effect of comparison.
(*i*) When only partially seen, as in the case of troops firing from cover.
(*j*) Troops kneeling or lying in the open seem farther away than when standing.

(iii) **Conditions which appear to Decrease Distance.**—Objects will appear larger, and therefore nearer than they are, under the following conditions:

(*a*) When both object and background are of different or contrasting colours.
(*b*) When the sun is behind the observer.
(*c*) In bright light or clear atmosphere.
(*d*) When the intervening ground is level or covered with snow.
(*e*) When seen across water or a deep chasm.
(*f*) When looking upwards or downwards.
(*g*) When the object is large, or when seen near any other object which makes it appear larger than it is by effect of comparison.

(iv) **A General Rule.**—A good general rule to remember for practical purposes is that *when a target is indistinct distance is apt to be over-estimated, and that when a target is distinct distance is apt to be under-estimated.* This general rule roughly sums up the effects and the various factors mentioned in paras. (ii) and (iii), which respectively tend to render targets less or more distinct.

3. Judging Lateral Distance by Eye.—The following is a rough guide for judging lateral distances running at right angles to the observer at various distances. With one eye shut and the hand at arm's length to the front with the fingers perpendicular, the breadth of six fingers will cover 100 yards of lateral distance at a distance of 500 yards from the observer. Under the same conditions, the breadth of three fingers will cover a lateral distance of 100 yards at a distance of 1,000 yards. The breadth of two fingers will cover a lateral distance of 100 yards at 1,500 yards, and the width of the thumb will roughly cover 100 yards of lateral distance 2,000 yards away. This method may be employed for estimating the approximate length of an

enemy's column, or the extent of frontage known to be occupied by him.

4. Method of Instruction—(i) **Units of Distance.**—All the methods mentioned in para. 1 should be practised by officers, N.C.O.'s, and men under a variety of practical conditions, and in the prone, kneeling, and standing positions, until it is found that distances can be judged approximately from the general impression conveyed to the eye. The class will first be familiarized with short units of distance not exceeding 600 yards. *Special care will be taken to enable soldiers to recognize the distance of 600 yards, as it is the limit of individual fire.*

(ii) **Figures.**—The class will at the same time study the visibility of the human figure standing, kneeling, and lying at known distances. They will be required to remember the results of their observation, and be given opportunities of seeing figures in varying conditions of light, atmosphere, and background at known distances.

(iii) **Features of Ground.**—The class will next be practised in judging the distance of natural features of ground, such as folds of ground, hedges, patches of undergrowth, and other forms of cover, at various known distances. This instruction will be followed by judging the distances of fatigue-men seen at unknown distances in the different firing positions both in the open against various backgrounds and partly behind cover. The class will then be practised in judging the distance of features of ground and different forms of cover at various unknown distances. These various practices should be carried out with the class in the standing, kneeling, and prone positions.

(iv) **Reasons for Estimates.**—Each observer should be asked by the instructor to give reasons for his estimate of distance to guard against the habit of rough guessing. To train observers in the habit of taking into account every factor which will help them to judge distance, the instructor

should consider and explain the effects of local conditions and other factors which affect judging the distance of each object he indicates after the class have made their estimates. Ample time should at first be allowed for judging distance, but as progress is made the time should be limited. The above exercises must include instruction in estimating lateral distances. *Rough guessing is never to be allowed.*

5. Aids to Judging Distance by Eye.—(i) The class should be trained in various methods of assisting the eye when the distance of objects is especially difficult to estimate approximately. For example, a maximum and minimum estimate of the distance may be made, and the mean taken as correct. Half the distance from the object may be estimated with the aid, if possible, of some feature of ground, and double may be taken as correct. When the object is partly hidden in a fold of ground, or when it is of unknown size, distance from it may be estimated with the help of some object of known size, such as a natural feature of the ground or a human figure which may be near it.

(ii) Other rough methods which will assist them in judging distance approximately may be explained to the men. For instance, the foresight of the rifle *when correctly aligned* will be approximately equal to the height of a standing figure at 400 yards. The width of an ordinary pencil held horizontally at arm's length before the eye will cover an upright figure at 200 yards, and the lead at its thick part will cover a standing figure at 600 yards.

6. Tests in Judging Distance by Eye—(i) **Directions regarding Tests.**—In every company, and at depôts, in addition to instructional exercises, at least one test in judging the distances of four objects will be held for all ranks in every three months, the distances of the objects being between 200 and 800 yards.

All company officers, non-commissioned officers, and those men who are in possession of badges for judging distance, will also be tested once in every three months under regimental

arrangements in judging the distances of four objects between 200 and 1,400 yards.

Brigade commanders and officers commanding districts will issue such orders as may be necessary for exempting non-commissioned officers and men from these tests, but every officer and sergeant who would command a company or smaller unit on mobilization should attend four tests annually in judging distance up to 1,400 yards.

(ii) **Conditions of Tests.**—During tests in judging distance no assistance from maps or other means should be allowed. The tests will be conducted on unfamiliar ground, half the objects consisting of fatigue-men or dummy figures representing skirmishers, and half of natural objects marking fire positions, such as would be occupied on service.

The observers will lie down or kneel behind cover, and estimates will be recorded by adjusting the sights (or in the case of officers by writing) in multiples of 50 yards; the objects should have been previously placed or selected, or the position of the observers should be chosen, so that the correct distance may closely approximate to some multiple of 50 yards.

Half a minute will be allowed for each estimate, reckoned from the moment when the object is pointed out or a shot is fired to draw attention to the position of the object. At the conclusion of the half-minute a whistle should be blown, when the observers will stand to attention, and no further adjustment of the sights or writing will be permitted. The register-keeper will then examine each rifle or paper, and record the estimates in the register. On return to barracks, the mean percentage of error of each observer will be entered in the register, which will be preserved for record.

On the completion of the classification practices, the mean percentages of error made by each individual officer, non-commissioned officer and man since the last classification will be added together and divided by the number of tests which he has attended, the average thus obtained being regarded as the standard of proficiency of the individual until the next classification.

Officers, non-commissioned officers, and men whose mean error exceeds 20 per cent., and those who have attended less than two tests, will be regarded as inefficient. Additional practice

will be afforded weekly to all officers, non-commissioned officers, and men who are recorded as inefficient, until the next quarterly test. Officers and sergeants whose mean error exceeds 20 per cent. will not be classified as better than second-class shots.

Section 38.—Range-finding by Observation of Fire.

1. When Observation is Possible.—Observation of results is the best means of correcting errors in sighting, but it is only practicable (*a*) when the ground in the vicinity of the objective is of a nature to show the strike of the bullets by dust, or (*b*) when the enemy is in the open, and the accuracy of fire can be judged by its effect upon him.

2. Nature of Fire Necessary for Observation.—*A considerable volume of rapid and concentrated fire is necessary to enable the strike of bullets to be observed*, and for this purpose one or more Maxim guns, or not less than two platoons, should be employed to fire. The distance and nature of the ground will determine the volume of fire required, but the greater the difficulty of observation the greater must be the volume of fire. When trying for observation, third-class shots should not be permitted to fire.

3. Method of applying Fire for Observation—(i) **Elevation.**—An elevation well *under* the estimated distance should first be selected, and if the fire can be observed, the elevation should be increased by not less than 100 yards at a time until the nucleus of the bullets is seen to fall on the desired spot.

(ii) **Objective.**—The point at which the fire is directed may be the actual objective, or ground in its vicinity which is more suited to observation of the strike of the bullets.

(iii) **Position for Observation.**—The best position from which to observe fire is behind, and, if possible, above the firers; but in this position the bullets which fall short will be

most easily seen, and may be mistaken for the nucleus of the fire. Further, all shots will appear to strike nearer to the observer than is really the case.

(iv) **Hints for Observers.**—To an observer on or behind a flank of the firers, shots which pass over the mark will appear to fall towards the flank on which he is posted, and those which drop short to fall towards the opposite flank. Thus, if the majority of shots seem to an observer on the *right* flank to fall to the *right* of the mark, the range has been *over-estimated*, and if they seem to fall to the *left*, it has been *under-estimated*.

4. Verifying Ranges by Fire.—When there is time and opportunity for doing so, ranges which have been taken beforehand, especially those taken in preparing a defensive position, should be verified by the results of firing a number of rounds.

Section 39.—Ranging by Auxiliary Methods and by Instruments.

1. Training in ranging should include instruction in practical auxiliary methods such as by maps and range-finding instruments. *Exercises in ranging by means of maps, range-finders, and the eye, used in combination, should form an essential part of the fire-direction practices of the annual course of musketry.*

2. Ranging by Map-Reading.—Ranges may be ascertained by the use of small scale maps, though large scale maps, if available, will be better for this purpose. Instruction in field-sketching and reconnaissance affords excellent opportunities for training in judging distance. For map-reading, see *Signalling* of this series; and for field-sketching and reconnaissance, see *Drill and Field Training* of this series.

3. Back-Reckoning.—Back-reckoning may be defined as deduction as to distance made from any known range.

For instance, in advancing on a position the range of which is ascertained on commencing the advance, the distance gained by each forward movement may be deducted from the original range of the position in estimating its range for firing on it at successive halts. Again, the range of an objective further away than another objective, of which the range is known, may be estimated by adding to the known range the estimated distance of the former from the latter objective. An example of back-reckoning is shown in Fig. 44.

4. Ranging by Gun-Flash and Sound.—Light travels at the rate of 186,000 miles a second, so that a gun-flash is practically seen as it issues from the muzzle, irrespective of the distance of the observer. Sound, on the other hand, travels about 1,100 feet, or about 365 yards, a second. By timing the interval between seeing the flash of a gun and hearing the report, its approximate distance may therefore be deduced. This, of course, will only be possible when the position of the gun is betrayed by the flash, and when guns are fired singly at appreciable intervals, or simultaneously, so that there is practically one flash and one report at a time.

5. Range-Finding Instruments.—A certain number of officers, N.C.O.'s, and men in each unit will be trained to use the One-Man Range-Finder or the Mekometer instrument, full directions regarding the use of which will be found in the official handbooks dealing with these instruments.

Section 40.—Range-Cards and Range-Marks.

1. Range-Card.—A range-card is a device for giving ranges to various points in a field of fire for use in attack or defence. Range-cards should be prepared by fire-unit

commanders for their own use and for use by N.C.O.'s and observers. When possible, the best way to prepare a range-card is to use a piece of a large scale map of the country on which to draw the range circles and direction lines. There will usually be more time for preparing range-cards in defence than in attack, and consequently range-

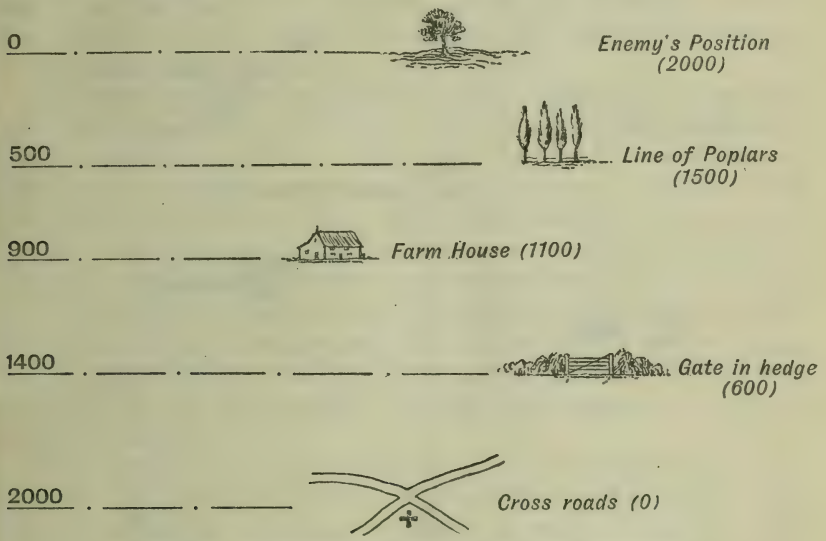


Fig. 44.—Simple Range-Card for Attack.

Note.—The distances on the left are those from the enemy's position. Those on the right in brackets are only for the range-taker's information, and should not be shown on the card to avoid confusion.

cards prepared for defensive positions will as a rule be more elaborate than those made for use in attack.

2. A Simple Range-Card for Attack.—Fig. 44 shows a rough example of a simple range-card made for use in attack over the ground shown in the left sector of the sketch

in Fig. 47, from which it will be seen that the objects on the range-card are taken. This has been done to make the example more practical and interesting. The ranges are supposed to be taken from the cross-roads at X to a series of prominent objects on or a little to either side of the line of advance. The distance of each of these points *from the*

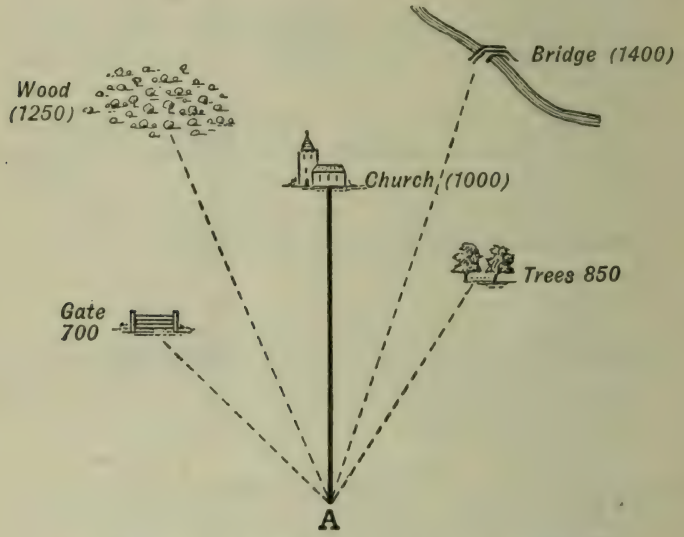


Fig. 45.—Simple Range-Card for Defence.

Note.—The point from which ranges are taken should always be described clearly on the card to facilitate setting it.

enemy's position (2,000 yards away) is carefully noted, and thus ranging during the attack is greatly facilitated. The range of the enemy's position from intermediate points can also be more easily estimated by back-reckoning.

3. A Simple Range-Card for Defence.—Fig. 45 shows a rough example of a simple range-card made for use in

defence. The ranges in this case are supposed to be taken from the point *A* immediately south of the church. The direction line from *A* to the church is drawn thicker than the other lines to facilitate "setting" the range-card in the same manner in which a map is set. When the card is set for the point from which ranges are taken—which is noted on the card—by pointing the thick direction line on the church, the other direction lines will indicate the ranges of the other points marked on the card.

4. Foreground Range Sketch.—(i) Fig. 46 shows an example of a foreground range sketch for use in a defensive position. Such a sketch would as a rule only be made in connection with very carefully prepared firing-points; but as from seven to ten hours or more is required to make any serious attempt to prepare and conceal a series of firing-points carefully, it is clear that the range-taking and range-marking party should have ample time to make an exhaustive reconnaissance of the foreground, to put out the range-marks, and to record their work in some simple form. One sketch such as Fig. 46 is sufficient for the commander of a group of firing-points.

(ii) Points, the range of which may be ascertained and marked with advantage in such sketches, include the exits and entrances to all areas of dead ground, or likely cover from view or fire; the crests or skylines—as seen from the firing-points—of all ridges and humps on the foreground; patches or lengths of road likely to be traversed by the enemy; gaps and gates in fences; corners of fields and enclosures; bridges, culverts, etc.; and conspicuous single objects, as guide-marks from which to estimate adjacent distances, such as isolated buildings, signposts, rocks, milestones, double telegraph-posts, or other such features.

(iii) As will be seen in Fig. 46, names may also be allotted to patches of dead ground within 1,000 yards or so of the firing-point. The abbreviated names of months and days

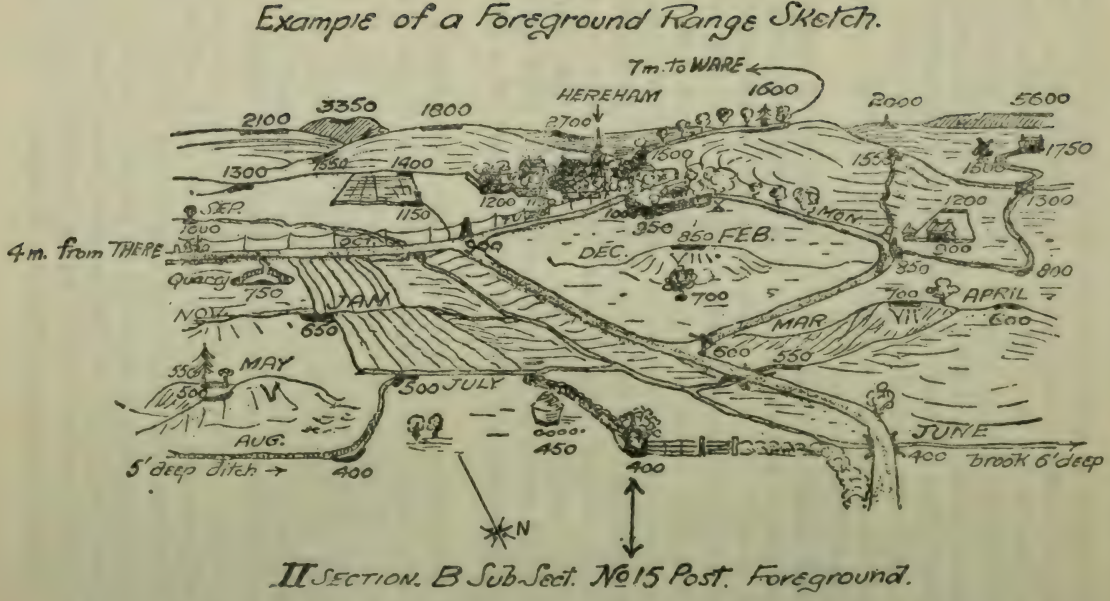


Fig. 46.—EXAMPLE OF A FOREGROUND RANGE SKETCH.

Note.—Ranged points are indicated by a thick line. The appearance of the Range-Marks is shown thus:—VIII. [=850 yds.] Names have been allotted to important dead spots within 1,000 yards—*e.g.*, FEB. refers to the dead area immediately behind the ridge ranged as 850.

of the week lend themselves to such a purpose, though any other short names will do equally well.

5. Range-Marks.—Range-marks are of special value to the defenders in those firing-points in which they have been told off *to watch for and deal with the enemy's supports and reserves* during their advance, after fire has been opened and the enemy's firing-line is already pinned down, or is unable to cross certain areas on a foreground prepared for defence until strongly reinforced (see p. 162, para. 3 (x), *Field Entrenchments* of this series).

6. Marking Ranges on Ground.—(i) The actual marking of ranges on the ground by means of visible marks may be done as follows: Range-marks should be provided, and should be placed on that side of large trees, houses, banks, etc., which is only visible to the defence. The simplest arrangement consists of one white object per 100 yards range; 500 yards may be denoted by the sign **V**, made with two boards, poles, etc.; and 1,000 yards by the sign **X**; intermediate hundreds being indicated by single objects in addition, as above described. On a bank or slope facing the firing-points Roman numerals may be cut out on the turf, etc., or formed by arranging stones or planks

(ii) **Marking on Trees.**—For marking on a tree the hundreds marks must be one below the other, and patches of tin do very well for this. For marking "fifties" an object much smaller but distinctly visible may be added, or one object quite different to the remainder. On a tree marked with tin discs, for example, half a disc would do for 50 yards.

(iii) **Marking on Buildings.**—For marking on a building, the colour to be used depends on that of the masonry, etc. A whitewash-brush is one of the best implements, if obtainable, and the marking can be either large Roman numerals or ordinary figures if they can be read clearly.

(iv) **Examples of Marks.**—In Fig. 46 five artificial range-marks are shown—namely, oooo·(450) at the stack, V on

May hill, VII on March-April ridge, VIII·(850) on Dec.-Feb. ridge, and X where Monday road disappears into Hereham village. The walls round the village might be marked in a similar manner, but the sketch is too small to show the marks.

(v) **Size of Marks.**—A practical rule for the *size* of mark is 1 foot of height to the mark per 100 yards in the range, unless the background is very good—such as black spots on a white wall—when half this allowance will be ample.

CHAPTER VI

FIRE DIRECTION AND CONTROL

Section 41.—General Remarks.

1. In the previous stages of instruction the foundation of training for fire action beyond close range will have been laid. The eyesight of both fire-unit commanders and men will have been trained to discern service targets at all ranges, and they will have become familiar with their appearance under various conditions of light and atmosphere, and accustomed to look for them and detect them quickly. Both fire-unit commanders and men will also have been trained in military vocabulary and the study of ground, so that they apply a common phraseology to various military objects, especially those under the head of service targets, and also to the ground and its natural features, the military value of which they will have learned in field training through instruction in the use of ground and cover.

2. Fire-unit commanders and men must now be taught to work together as an unit in directing fire at service targets beyond close range by the efficient performance of the various duties described in the following sections. This instruction should commence with lectures, illustrated if possible by the use of the Solano and landscape targets as described in Secs. 72, 73, and 74. Lectures should deal with organization for fire action, the effect of rifle fire at various ranges, the tactical application of rifle fire, the description and recognition of targets, fire orders, fire discipline, and night firing.

3. Lectures and Demonstrations (see pp. 221-225). Special lectures in their duties should be given to fire-unit commanders, non-commissioned officers, and observers, and these lectures should include information and hints which will enable fire-unit commanders to train their men both by lectures and practical instruction. Lectures to men should be given by their fire-unit commanders, and should deal with all the various duties which are combined for fire action, including organization and the duties of fire-unit commanders. These lectures must deal thoroughly with the duties of men in the firing-line and with the vitally important subject of fire discipline (see pp. 214, 215).

Section 42.—Organization for Fire Action.*

1. Fire direction and control depend in a great measure upon good organization for fire action. The value of this organization depends on the fitness of superior officers and battalion commanders to handle their troops efficiently, and issue such clear and concise orders as will enable each unit to carry out its allotted task well supported, with their communications and ammunition supply well maintained. The duties of organization for fire action may be described generally as follows:†

(i) Allotment of frontages and objectives to various units.
(ii) Arrangements for communications and ammunition supply.
(iii) Arrangements for covering fire by supports and reserves, machine-guns, and artillery.

* See also Sec. 72, para. 8.

† See Sec. 28 of *Drill and Field Training* of this series for information as to *communications*, for which, with information as to *ammunition supply*, see also *Infantry Training*, 1914. *Infantry covering fire* is dealt with in Sec. 44, para. 13, of this book. Arrangements for covering fire by machine-guns are dealt with in *Machine-Gun Training* of this series (see also *Field Service Regulations* and *Infantry Training*, 1914).

2. Allocation of Frontages and Objectives.—Both in attack and defence a definite frontage in the field of fire—termed a *sector*—should be allotted to each fire-unit by company and platoon commanders. Thus the enemy appearing in any given sector will at once be engaged by the unit to which that particular sector has been allotted. Each fire-unit commander on receiving orders as to his frontage, will indicate it to his unit in the manner described in the following paragraphs, and must make sure that the N.C.O.'s, observers, and men of his unit clearly understand the extent and limits of their sector.

3. Indicating the Limits of Sectors (Fig. 47).—The limits of each sector will be indicated by means of suitable description points (see Sec. 45, para. 3) on each flank of the frontage allotted to an unit. These description points should, as a rule, consist of distant features of a landscape or of the field of fire. If no suitable description points mark the limits of a sector exactly, the limits will be indicated as being so many hand or finger breadths (Sec. 45, para. 7) to the left or right of the nearest suitable description point. The limits of sectors may be made to overlap in the same manner. In defence there will generally be ample time for allotting frontages. In attack frontages will usually be allotted on deployment, but whenever possible they will be selected beforehand by preliminary reconnaissance.

4. Object of Overlapping the Sectors.—The overlapping of sectors insures that the entire front is kept under close observation, and that no part of it remains unswept by fire should occasion arise for delivering fire at a target in any part. It also prevents waste of ammunition and loss of fire effect through units firing at objectives outside their own sectors unless this is necessary for the purpose of mutual support.

5. Example of Field of Fire divided into Sectors.—(i) Fig. 47 shows a field of fire divided into overlapping

sectors by the use of description points. The sketch illustrates the arrangements made, as the result of a hasty preliminary reconnaissance, by a company commander for fire action by the four sections or normal fire-units of his command on deployment in the early stage of attack. In defensive positions similar arrangements may be made for indicating sectors allotted to each locality. Defensive positions will usually include a number of localities of special tactical importance. From these localities either direct or flanking fire, or both, is brought to bear on all ground over which the enemy may advance. As long as this is done the intervening ground between localities need not be held in a continuous line.

(ii) In defence, the arrangements for fire action will include the various measures described in Chapter VIII of *Field Entrenchments* of this series, such as clearing the foreground of features which would afford cover to the enemy and assist his advance, and clearing it of features to improve the defenders' field of fire, together with the construction of different obstacles to impede and check the enemy's advance or cause him to select lines of approach along avenues commanded by the fire of the defenders.

6. Direction and Control of Fire.—Fire is said to be *directed* by the commander, who defines the objective against which it is to be used, and to be *controlled* by the fire-unit commanders, who give the necessary executive words of command. In attack occasions will frequently arise when fire-unit commanders must both direct and control the fire of their units, while at close ranges, or when men are widely extended, it may happen that the transmission of any fire-order is impossible, and that each individual man must control his own fire.

7. Fire-Unit.—The normal infantry fire-unit is the section, though under certain conditions at the longer ranges the

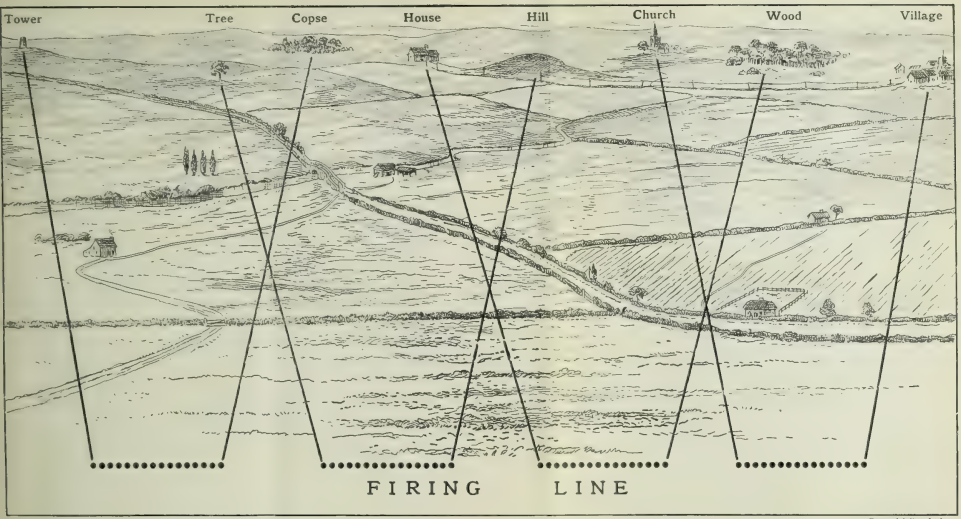


Fig. 47.—Rough Sketch of a Field of Fire divided into Overlapping Sectors by the Use of Description Points on Deployment in Attack.

To face p. 108.

fire of a platoon, or even a whole company, may be controlled by its commander. *The efficiency of section commanders is therefore of paramount importance.*

8. Duties of Fire-Unit Commander.*—(i) The value of a fire-unit commander depends upon his ability *to apply the fire of his unit at the right time and in the right volume to the right target.* In addition to his other duties, the fire-unit commander is responsible for:

(*a*) Indicating targets.
(*b*) Issuing orders for sighting, and, when possible, supervising the correct adjustment of sights.
(*c*) Regulating the volume of fire, whether deliberate or rapid.
(*d*) Reporting to platoon or company officers when ammunition is running short.

(ii) The additional duties of the fire-unit commander referred to in the above paragraphs may be described generally as follows:

(*a*) Watching for favourable targets.
(*b*) Watching for signals from platoon or company officers.
(*c*) Observing effect of fire.
(*d*) Seizing all chances of firing for mutual support.
(*e*) Seeing that all orders are properly passed.
(*f*) Seeing to issue and redistribution of ammunition.
(*g*) Selecting halting places in attack.
(*h*) Making best use of ground and cover.
(*i*) Re-forming and telling off units as opportunity offers. During the attack advantage will be taken of dead ground and cover to re-form separate units which may become mixed owing to confusion, especially in the later stages of attack.

* With regard to opening fire, see Sec. 44 paras. 3 to 6.

9. Duties of Observers.—Men trained as observers will be employed, as necessary, to assist fire-unit commanders in observation of fire, in watching the enemy and neighbouring troops, and in keeping up communication between platoons. Observers will also be trained in the duties of ranging and control of fire, so that they can carry them out if fire-unit commanders are incapacitated.

Section 43.—Effect of Fire at Different Ranges on Various Formations and Objectives.

1. Effect of Fire at Various Ranges—(i) **Close Range.***—Owing to the flatness of the trajectory, it should be possible to obtain the maximum effect from rifle fire at targets within close range—given a good field of fire and the absence of dead ground and other conditions unfavourable to fire effect at all ranges—*provided that fire discipline is good and that individual soldiers select their targets and fire carefully, making due allowance for elevation by aiming down when necessary.*

(ii) **Effective Ranges.**—Between 600 and 1,400 yards, carefully controlled collective fire produces better results than the uncontrolled fire of individual men, which ceases to be sufficiently effective beyond ranges of about 600 yards to counterbalance the expenditure of ammunition involved. At effective ranges troops advancing steadily and rapidly suffer less than when they remain lying down, even under moderately good cover. This is due to the moral effect on the enemy and to the constant alteration of the range.

(iii) **Long and Distant Ranges.**—Beyond 1,400 yards the fire of even large and well-controlled units of infantry has seldom much effect upon the decision of the struggle for

* See Preface, para. 11.

superiority of fire. Exceptional circumstances, such as the appearance of considerable bodies of the enemy in vulnerable formations, may, however, justify the use of long-range fire, especially in the defence.

2. Effect of Rifle Fire on Various Formations and Objectives—(i) **Infantry.**—On open ground swept by effective rifle fire an extended line is the least vulnerable formation for infantry, and on such ground it will usually be advisable to extend before it becomes necessary for the advancing troops to open fire. The greater the extension of a line, the fewer will be the casualties, but the less will be its fire effect [see Preface, para. 8 (i)].

(ii) **Cavalry.**—The fire effect which infantry can develop against cavalry is such that infantry which is ready to open a steady and timely fire has nothing to fear from a cavalry charge, provided the cavalry cannot find dead ground over which to approach. Any formation which allows fire to be delivered quickly and accurately is suitable for meeting cavalry. Closing an extended line to meet cavalry delays the opening of fire, and may offer a vulnerable target to the enemy's artillery. Even if cavalry succeeds in riding through a firing-line, it can inflict little loss upon it if the infantry holds its ground. Whenever there is a possibility of being charged by cavalry, special care must be taken to watch and guard the flanks.

(iii) **Artillery.**—Artillery coming into action, limbering up, or in movement, is a vulnerable target against which rapid fire or even fire at long infantry ranges is justifiable. Infantry will experience difficulty in putting shielded artillery out of action *by direct fire* even at close infantry ranges, but it can prevent the artillery from moving and interfere with the service of the guns. Infantry can best obtain decisive effect against guns with shields by means of *enfilade or oblique fire*.

(iv) **Machine-Guns.**—Machine-gun sections with their guns

on travelling carriages are as vulnerable as artillery limbered up; but detachments carrying the gun into action are difficult to distinguish from infantry. Machine-guns in position *are usually concealed*, and are a difficult target. To obtain good effect against them it is usually necessary to employ a considerable number of rifles.

(v) **Aircraft.**—Aircraft form a very difficult target to fire directed from the ground, and only a small proportion of their area is vulnerable. Bullets can pass through the fabric of aeroplane wings without doing serious damage. Indiscriminate fire at hostile aircraft is, moreover, likely to cause casualties in neighbouring units, and will also disclose the position of the troops to the enemy's observer. The strictest control must be exercised over all fire directed against aircraft. In the case of rifle fire at *aeroplanes*, men should be instructed to aim *six times the length of the machine in front*, and *at the nose of the envelope* in the case of *airships*.

(vi) **Retiring Troops.**—Other conditions being equal, the effect of fire in the open at all ranges is always greater when directed at retiring troops as compared with the effect on troops advancing.

Section 44.—Tactical Application of Rifle Fire.

1. In connection with the tactical application of rifle fire, it must be remembered that the essence of infantry tactics in the attack consists in breaking down the enemy's resistance by the weight and direction of its fire, and then completing his overthrow by assault—that is, *by bayonet charge*. Although the enemy may not await the assault, *infantry must always be animated with the desire to close with him as quickly as possible*. Troops under cover, unless enfiladed, can seldom be forced to retire by fire alone, and

a decision by fire, even if possible, takes long to obtain. *To drive an enemy from the field, assault, or the immediate threat of it, is almost always necessary.*

2. Superiority of Fire.—The object of fire action is to attain superiority of fire over the enemy's fire. Fire is said to attain superiority when by its superior effect it beats down or silences the enemy's fire. Superiority of fire in the different stages of attack enables the advance to be pushed up by degrees to ground from which the assault can be delivered on the enemy's position. Superiority of fire enables the defence to check the enemy's advance, and in active defence to create opportunities for a general assumption of the offensive or for local counter-attacks. *Superiority of fire is produced by superior efficiency in* (*a*) *fire direction and control,* (*b*) *fire discipline,* (*c*) *use of the rifle, and* (*d*) *ammunition supply.*

3. Opening Fire.—When from his position it is possible to do so, the company commander decides as to the time for opening fire, subject to such orders as the battalion commander may issue, and regulates the supply of ammunition. In the defence he also normally arranges for the distribution or concentration of fire, and indicates the targets generally to his subordinates; but in the attack these duties will usually devolve upon the subordinate commanders with the firing-line.

4. Decision as to Opening Fire.—In forming a decision as to when fire should be opened, regard must be had to the necessities of the tactical situation. The following conditions must also be taken into account:

(i) **Surprise.**—The early opening of fire discounts surprise, and, whether in attack or defence, often indicates the position of troops which would otherwise be unnoticed by the enemy. In attack it may delay the advance unnecessarily.

(ii) **Effect of Fire at Different Ranges.**—The effect of fire at

various ranges must be taken carefully into account. This subject is dealt with in Sec. 43, para. 1.

5. Opening Fire in Attack.—(i) In connection with the considerations mentioned in para. 4 (i) and (ii) above, fire, as a general rule, should rarely be opened by infantry in attack when satisfactory progress can be made without it. The leading troops in particular should save every possible round for the final struggle for superiority of fire at close range, as the replenishment of ammunition in the firing-line at that time will be a matter of considerable difficulty.

(ii) When progress is no longer possible, fire should be opened, either by such parts of the firing-line as cannot advance, or by bodies of infantry specially detailed for this purpose, to enable a further advance to be made. Subject to these principles, fire may be opened in attack when there is a probability of its producing good effect, or when withholding fire might lead to heavy loss.

6. Opening Fire in Defence.—When infantry is acting on the defensive, there is usually less difficulty in arranging for the supply of ammunition. Fire may therefore be opened at longer ranges than when attacking, if it seems probable that any advantage will be gained thereby, especially when it is desired to prevent the enemy coming to close quarters, and when the ranges have been ascertained beforehand. If, however, the object is to gain decisive results, it is generally preferable to reserve fire for closer ranges and for surprise (Practice No. 1, p. 226).

7. Fire and Movement.—It is clear from the above considerations that fire is closely related to movement. The direct object of fire in the case of attack and counter-attack is to facilitate movement, and also to check or hinder the movements of the enemy. The direct object of fire in defence is to check the movements of the enemy, and in the case of active defence to create an opportunity for the assumption of the offensive or for local counter-

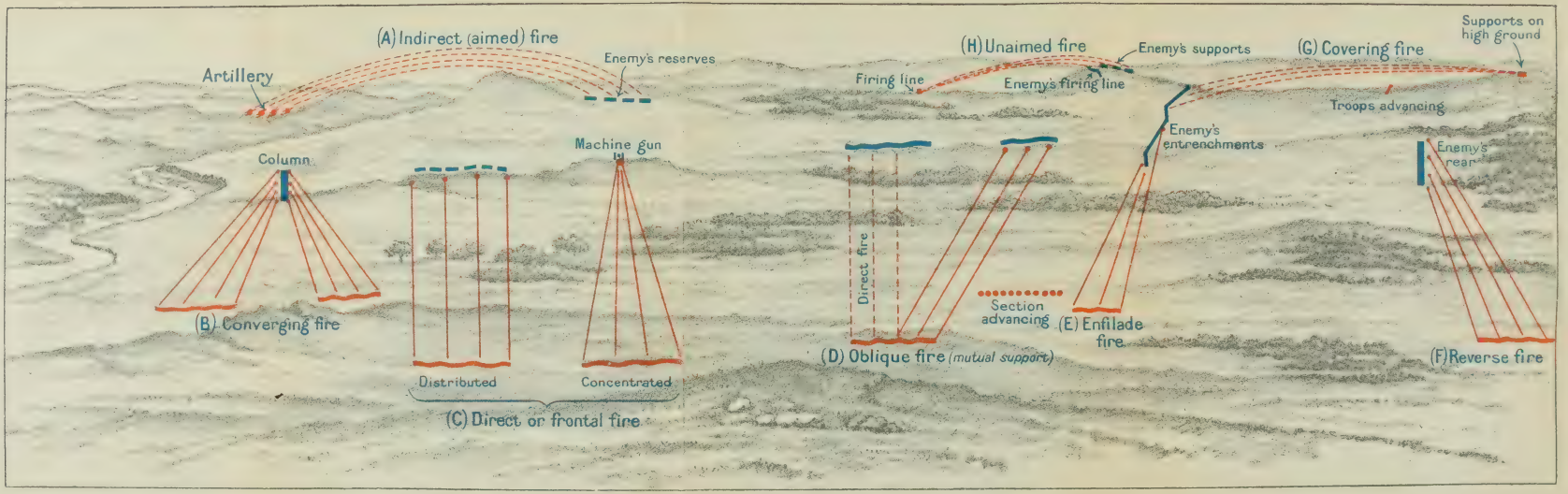


Fig 48 Diagram illustrating the Tactical Application of Fire.

attacks. *Fire, therefore, is related to movement, and its proper application with respect to movement is one of the principal objects of training in fire control.*

8. Concentrated Fire (Fig. 48).—Collective fire may be concentrated or distributed. Concentrated fire produces a cone of fire favourable to observation of results, and is more effective than distributed fire at the point of application. Against narrow-fronted targets, such as the head of a column or a machine-gun, or against very vulnerable targets, or to produce an increased effect at a particular point, fire may be concentrated with advantage.

9. Distributed Fire.—(i) It is usually necessary to distribute fire so as to keep the enemy's firing-line under fire throughout its length, in order to disturb his aim and prevent his movements. Fire employed to cover movements or directed on entrenchments should be distributed carefully and systematically [see also Sec. 54, para. 3 (v)].

(ii) **Sweeping Fire** (Fig. 48).—Fire distributed *laterally* is called sweeping fire. Such fire is to be preferred for neutralizing an enemy's fire along any portion of his front.

(iii) **Searching Fire** * (Fig. 7).—Fire distributed in depth is called searching fire. Such fire gives greater assurance that some portion of the fire will be effective when the target has not been located definitely, or when serious errors in sighting are to be expected.

10. Oblique and Enfilade Fire (Fig. 48).—Both oblique and enfilade fire have greater moral and material effect than frontal fire, for they usually come from an unexpected direction, and the targets presented to them are generally more vulnerable than those presented to frontal fire. In defence, opportunities for the employment of enfilade fire may be created by careful pre-arrangement between the commanders of adjoining units.

11. Converging Fire (Fig. 48).—Converging fire is fire

* Sec. 13 should be read in connection with this paragraph.

directed at a target from two or more different points simultaneously. The moral and material effect of converging fire may be very great, as it may combine the effects of frontal, oblique, and enfilade fire at one and the same time (Demonstration No. 3, p. 222).

12. Mutual Support (Fig. 48).—(i) The various portions of the firing-line will also on occasions be able to afford each other mutual support by fire, and all commanders must be on the alert to assist units on their flanks in this manner when the situation requires. Covering fire in mutual support should consist of heavy bursts of rapid fire, sustained during the forward movement, and directed at the enemy to the front of the advancing unit, as well as to the front of the unit firing (Practice No. 1, p. 226).

(ii) Mutual support in the firing-line will as a rule, however, be more automatic than deliberately arranged, and in no case must its employment be allowed to induce hesitation in the advance. The paramount duty of all leaders in the firing-line is to get their troops forward, and if every leader is imbued with a determination to close with the enemy, he will be unconsciously assisting his neighbour also, for as a rule *the best method of supporting a neighbouring unit is to advance.*

13. Covering Fire (Fig. 48).—(i) When the ground permits, it is generally necessary to detail special detachments of infantry to provide covering fire for the leading troops. These detachments will usually be detailed by battalion commanders from local reserves in the original distribution for the attack, but any commander, at any stage of the fight, may detail troops from those under his command to assist his advance. No fire-unit commander, however, is justified, on his own initiative, in withdrawing from the advance or ceasing to seek an opportunity to advance in order to constitute his command a detachment for providing covering fire (Demonstration No. 6, p. 223).

(ii) In undulating or mountainous country it may be possible for detachments employed to provide covering fire to cover the advance from positions in rear, but in flat country it may be dangerous or impossible for infantry or machine-guns to fire over the heads of their own troops, and opportunities for providing covering fire should be sought on the flanks.

(iii) Troops detailed to provide covering fire for the advance must take care to select as targets *those bodies of the enemy whose fire is chiefly checking the advance.* Great difficulty will often be experienced in discovering which these bodies are, and all ranks must be on the alert to notice any indication which may help to discover them.

(iv) As soon as their fire ceases to be effective in aiding the advance of the firing-line, it is the duty of troops detailed to provide covering fire *at once to join in the advance,* unless definite orders to the contrary have been received.

14. Volume of Fire.—In deciding on the volume of fire to be directed against the enemy at any particular time, a commander should consider chiefly the tactical situation, the target presented, the effect it is desired to produce, the range, and the state of the ammunition-supply.

15. Rates of Fire.—*The rate of fire will always be regulated carefully according to tactical requirements.*

(i) **Slow Desultory Fire** may disturb the enemy's aim, but it is opposed to principles of surprise.

(ii) **Deliberate Fire.**—The rate of deliberate fire should not exceed six rounds a minute.

(iii) **Rate when Working in Pairs.**—Soldiers working in pairs for observation and mutual support (Sec. 47, para. 4) may *each* fire about three rounds a minute.

(iv) **Rapid Collective Fire.**—In rapid collective fire the rate will vary according to the visibility of the aiming-mark, the range, and the standard of training a man has reached. With a distinct aiming-mark within about 1,000 yards a

well-trained man should be able to fire from twelve to fifteen rounds per minute without serious loss of accuracy.

16. Use of Rapid Fire.—(i) *Rapid fire should be considered as a reserve of power to be used when the occasion demands it.* It must never be used except when occasion most fully justifies it, otherwise serious waste of ammunition will result. *Rapid fire must combine accuracy with rapidity, and never degenerate into a wild expenditure of ammunition at the fastest possible rate.* If rapid fire is ordered, *each man will fire at his own best rate for combining rapidity with accuracy.*

(ii) Rapid fire may be employed generally when it is necessary to beat down the enemy's fire quickly; when covering the withdrawal of other troops; when pursuing an enemy with fire; when meeting cavalry attacks; and when good targets are exposed. In attack, rapid fire is employed by all troops as final preparation for the assault. In defence, it is employed to beat off an enemy in the act of assaulting (Practices Nos. 5 and 6, p. 228).

17. Short Bursts of Fire.—(i) The effect of surprise by a sudden burst of accurate fire from an unexpected quarter is very great. Short bursts of rapid fire, followed by pauses, favour observation of results, and give time for the adjustment of sights. They also facilitate the control of fire in critical situations.

(ii) The duration of such bursts must be strictly controlled, and limited to the requirements of the occasion, for if rapid fire is continued for any length of time, it excites and exhausts the troops, and leads to waste of ammunition. In order to insure control and facilitate the passing of orders, the number of rounds to be fired may be named, as, for instance, *ten rounds fire, or rapid fire.*

18. Surprise.—A sudden effective fire is known to have a particularly demoralizing effect on the enemy; it is often advantageous, therefore, to seek for surprise effects of this sort by temporarily withholding fire.

19. Unsteady Firing.—Wild, unsteady fire causes little or no loss, and tends to encourage the enemy by inducing a belief in his mind that his opponent is shaken. It is therefore worse than useless against good troops. *If firing tends to become wild, it should be stopped, and only resumed under strict control and detailed orders.*

Section **45**.—Description and Recognition of Targets.

1. Importance of Good Description.—(i) Owing to the difficulty of discerning service targets beyond close range with the naked eye, collective fire cannot be effective unless the objective is described by the fire-unit commander in such a way that every individual of his unit can immediately recognize the target or point of aim indicated, and unless men are also trained to recognize targets and to bring fire to bear upon them immediately they are indicated. These three conditions—good indication of targets, immediate recognition of targets, and instant opening of accurate fire—are essential if full effect is to be obtained from fire, especially when directed at fleeting targets, such as troops in movement.

(ii) Bad description of targets or delay in opening fire due to this or other causes will lead to loss of fire effect, which may prove disastrous in critical phases of action. For example, bad description at the best will result in recognition of the target by some instead of all the men in an unit, as well as in delay in opening fire, which in the case of fleeting targets will render fire partly or wholly ineffective. Bad description may result in part or the whole of an unit mistaking another aiming-point near it for the target described, with total loss of fire effect due to firing at the wrong target. It may result in part or the whole of an unit becoming confused and not firing at all. It is clear, therefore, that good description and quick

recognition of targets is essential for fire effect at longer ranges, and that these duties form a vitally important part of the training of fire-unit commanders and men.

2. Need of System in describing Targets.—As service targets, such as a fold in the ground or a patch of open ground, will often be without any definite feature to distinguish them from similar aiming-points near them, or to locate their position exactly, and as targets generally will be difficult to describe on ground devoid of prominent or well-marked features, it is necessary to adopt a system of description which will enable fire-unit commanders to indicate the most difficult aiming-points to their men clearly by some consistent method.

3. Description Points.—A good system of indicating targets is by description-points, consisting of natural or other features of the ground in the frontage allotted to an unit. If targets cannot be indicated sufficiently accurately by description-points alone, supplementary methods, known respectively as the Finger-breadth and Clock-face methods, may be used in connection with description-points, as described in paras. 7 and 8. As a rule the former of these supplementary methods only will be employed, and both will seldom be employed together in combination with description-points.

4. Selecting Description-Points.—(i) Company officers will select description-points when occupying a position or at the conclusion of movement. The number of description-points necessary will depend on the nature of the ground, and whether it has much or little detail in the shape of prominent natural and other features; but points should be selected so as to facilitate the indication of targets in all parts of the field of fire.

(ii) *The most prominent objects should be chosen.* They should be in the distance or middle of the field of fire, and as far off as possible. No two points, if it can be

avoided, should be similar—as, for instance, two church spires or clumps of trees. The points should be at least two hands' breadth apart. Each point should be named, and the name by which it is to be known should be communicated to fire-unit commanders and the men of their units.

(iii) There will usually be more time for selecting description-points in defence than in attack. For example, Fig. 46 illustrates a field of fire in front of a defensive position, in which almost every feature of ground has been named and the range of all prominent objects taken. Such preparation will be impossible, and to a great extent unnecessary, in attack, when time for even a short preliminary reconnaissance may not always be available. *Company, platoon, and section commanders should therefore be trained to select a few good description-points as quickly as possible, and indicate them by suitable names to their commands.*

5. Points of Military Importance.—In addition to the description-points, when there is time, any points in the field of fire which are of military importance—such as a road, a bridge (Fig. 50), or the forward edge of dead ground—at which fire may suddenly have to be directed, should also be named and indicated to fire-unit commanders. This should be done, if possible, whenever such points are difficult to describe and cannot be indicated quickly.

6. Rules for describing Targets.—(i) Targets must be indicated by short, accurate, clearly understood, descriptions of their nature, features, and exact position.

(ii) Field-glasses may be used to discern targets before indicating them. *But aiming-points must always be described as they are seen with the naked eye, and not as seen through field-glasses, otherwise the men, being without glasses, may fail to recognize them.*

(iii) In both attack and defence *the front should always be pointed out,* so that if a general direction, such as *half*

right, is used to indicate a target, men will look in the proper direction with regard to the front. This is necessary, because the formation of the ground, the line of cover, and the siting of trenches does not always permit of men facing directly to the front.

(iv) As a general rule the finger-breadth and clock-face methods of describing targets will only be used when they will *shorten and simplify* the description, as well as make it more accurate.

(v) Only one system of indicating targets should be employed in a battalion, and, if possible, in an army, so that the men may recognize targets described by commanders of other fire-units should they become separated from their own in action.

(vi) When possible, targets will always be described and their range given *before the occasion for firing arises*, so that men may adjust their sights and be ready to open fire without further orders as soon as the target appears.

7. Finger-Breadth Method (Fig. 49).—(i) This method may be employed to indicate roughly the approximate distance of an objective from a description-point. Only one hand should be used, even if more than one hand's breadth is required to indicate the distance. The arm must be held out perfectly straight from the shoulder in front of the face, with the fingers vertical. If, however, the object is immediately *above* or *below* the description-point, the fingers should be horizontal. In measuring distances, one eye should be closed, and both the description-point and the objective kept in view.

(ii) **Instruction in the Finger-Breadth Method.**—Results obtained by this method are necessarily inaccurate, because the hands and fingers vary in size and in distance from the eye with each individual. It is, however, a useful guide for measuring approximate distances. After the first few lessons in the use of this method, measurements should first be judged,

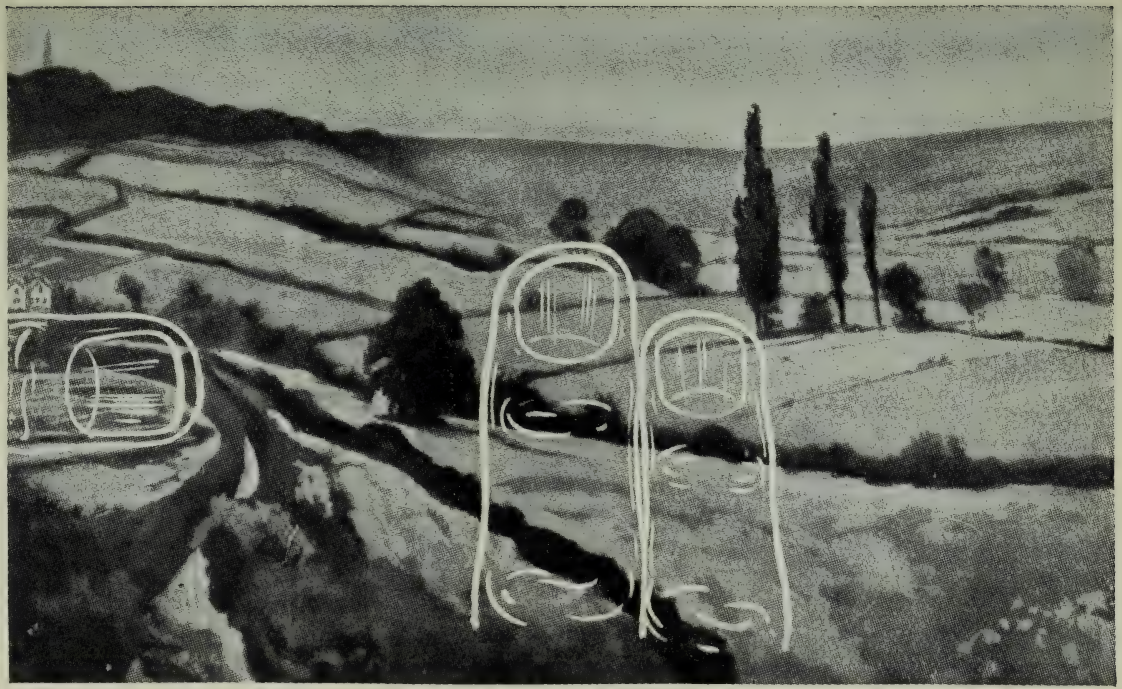


Fig. 49.—DESCRIPTION OF TARGETS—FINGER-BREADTH METHOD.

("Section Fire" Landscape Target, Panel No. 2.)

To face p. 122.

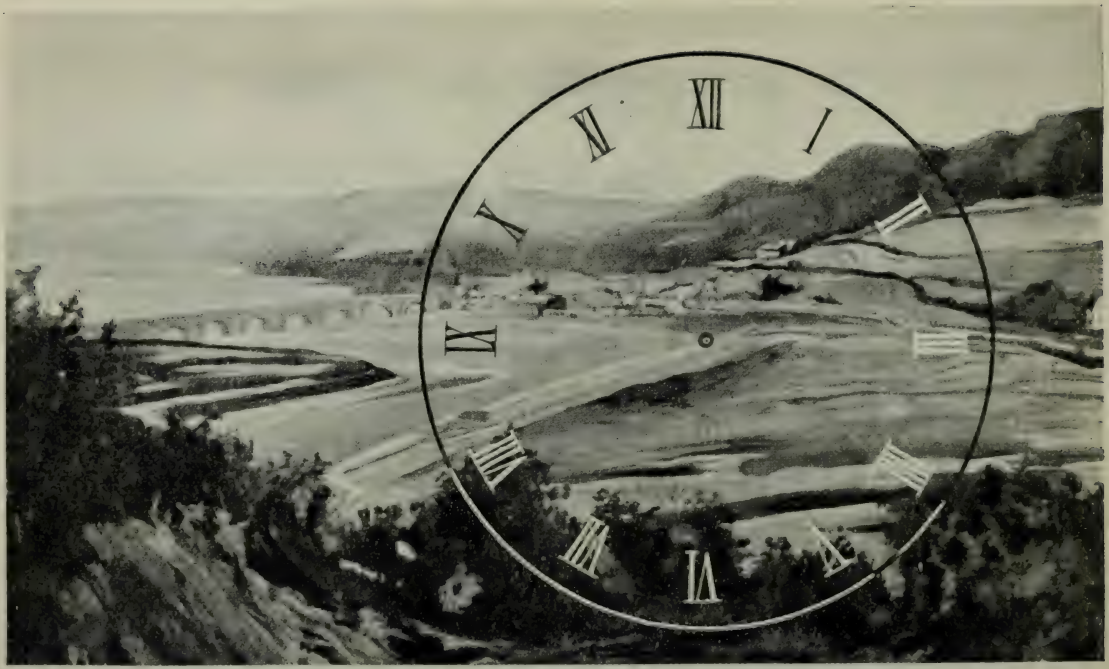


Fig. 50.—Description of Targets—Clock-Face Method.

("Section Fire" Landscape Target, Panel No. 1.)

To face p. 123.

and then the fingers should be used to check them. It will be found that when men have been thoroughly trained in this method they will seldom have to use their fingers for measurements at all except in very doubtful cases.

8. Clock-Face Method (Fig. 50).—This method may be used to indicate the position of the target described in relation to a description-point. In employing it, the clock-face must be imagined as hanging vertically, with its centre directly over the description-point. Thus, an objective vertically above the description-point would be described as being at twelve o'clock, while objectives to the right and left on the same horizontal plane as the description-point would be respectively at three and nine o'clock, and an objective directly below the description-point would be at six o'clock. *The direction, right or left, should always be given, as well as the hour, to avoid possible mistakes.*

9. Examples of Description of Targets—(i) **Description-Points.**—Fig. 49 shows a field of fire with plenty of detail, and serves to illustrate the method of indicating targets by the use of description-points alone, and by the use of these points in combination with the finger-breadth method. If the landscape in this figure is taken as representing a sector, the following features might be as description-points: (*a*) Right edge of wood on hill; (*b*) tallest poplar half right; (*c*) white house on left. The fire-unit commander would inform his unit that they would be named and referred to respectively as *Wood, Poplar, House,* in using them to direct fire.

(ii) **Indication by Description-Points.**—Examples of indicating targets by these description-points alone are as follows:

(*a*) *At* 1,000—*at centre of hedge running from left of poplar.—Ten rounds. Rapid fire.*

(*b*) *At* 1,400—*brown field to right of house—at right half of hedge running along top.—Fire.*

(iii) **Indication by Description-Points and Finger-Breadths.**—Examples of indicating targets by description-points combined with the finger-breadth method are as follows:

(*a*) *At* 800—*at foot of big tree two fingers left of poplar.—Five rounds. Fire.*

(*b*) *At* 900—*at fold of ground one finger below house.—Five Rounds. Rapid fire.*

For the purpose of illustration the finger-breadths are shown drawn on the landscape.

(iv) **Indication by Description-Points and Clock-Face.**—Fig. 50 illustrates the method of indicating targets by the use of description-points combined with the clock-face method. The point of river bend right bank might be indicated and named: *Bend :* This description-point would be imagined as the centre of a clock-face, which, for the purpose of illustration, is shown drawn on the landscape.

(v) The following example illustrates the method of indicating targets by this arrangement:

(*a*) *At* 1,400—*at junction of three hedgerows—bend—right—two o'clock.—Ten rounds. Fire.*

(*b*) *At* 1,000—*at spit of land—bend—left—between eight and nine o'clock.—Fire.*

(vi) **Indication by Description-Points, Finger-Breadths, and Clock-Face.**—Fig. 51 shows a sector consisting of a field of fire with very little detail, in which targets might have to be indicated by the use of description-points, combined with both the finger-breadth and clock-face methods, which rarely have to be used together in combination with description-points.

The small tree in centre of hedge, the right end of the hedge, and the left end of the hedge, or the small tree to the left, may be taken as description-points, named respectively *hedge right,—hedge left,—centre tree,* and *left tree.* This will be an exception to the general rule that no two points should consist of features of a similar nature,

Fig. 51.—Description of Targets—Example of Field of Fire suitable for Employment of Finger-Breadth and Clock-Face Methods, combined with Description Points.

("Section Fire" Landscape Target, Panel No. 3.)

To face p. 124.

but it is justified, as there is no danger of men confusing these similar features in the case illustrated.

Folds and ridges of ground could then be indicated in the manner of the following examples: *At* 900—*at fold of ground—centre tree—six o'clock—one finger.* This would mean that fire will be directed at a fold of ground one finger-breadth directly below the centre tree. Another example of this method is: *At* 800—*at ridge—left tree—right—three o'clock—one finger.*

10. Instruction in Description of Targets.—Training in description of targets should be carried out under practical conditions, according to the rules laid down in the preceding paragraphs. Training should be carried out on as great a variety of ground as possible under all conditions of light and atmosphere and at all ranges beyond close range. Instruction in the description as well as recognition of targets will form part of the field training, as well as of the advanced musketry training of both fire-unit commanders and men.

11. *In commencing an exercise, a front should always be pointed out.* At first the aiming-points to be described should be simple, and should consist of targets easily indicated with the aid of description-points alone. Subsequently more difficult targets may be indicated, which will necessitate the employment of either the finger-breadth or clock-face methods of description.

12. Fire-unit commanders may be trained in classes with a number of rifles on aiming-rests in the following manner: The instructor will indicate various aiming-points in different parts of a sector of ground to each member of the class in turn, not verbally, but by aiming a rifle at it, while the class are turned about, with their backs to the instructor. The instructor will next move his rifle from aim at the target and order the class to turn about, when the fire-unit commander will describe the target in his own

words, using description-points alone, or combining their use with the finger-breadth or clock-face methods, as may, in his opinion, be necessary. The class will then aim their rifles at the target which they recognize from his description. *If they do not recognize any target from his description, they will not aim their rifles.*

13. The instructor will next note the target at which each rifle has been aimed, and criticize faults both of description and recognition, pointing out those which caused errors or confusion. *Absolute accuracy of aim must be insisted upon, and faults in aiming at targets correctly recognized must be pointed out.*

14. Indication of Targets in Strange Country.—As the nature of the ground and its features will vary greatly in different kinds of country, fire-unit commanders and men should be trained in the description and recognition of targets, both before and during military operations in unfamiliar country.

15. Standard of Indication.—A very low standard of indication is one which results in four out of every five in the class recognizing the target from the description given, for it must be remembered that the class will consist of men who should have been thoroughly trained in military vocabulary and study of ground before they commence their instruction in recognition of targets. Fire-unit commanders, therefore, will not be considered efficient in indicating targets until all the members of a class are able with ease to recognize a variety of targets described by him.

16. Instruction in Recognition of Targets.—Instruction in recognition of targets may be carried out on the same method as training in description of targets, the targets being described verbally by the instructor, or by an efficient fire-unit commander. Men aiming at wrong targets, or not aiming because they have failed to recognize the target, will be asked to explain their difficulty, and the instructor

must try in each case to explain the cause of errors or failure to recognize targets, with a view to helping men to overcome it. Men will be trained to recognize targets by description-points alone, as well as in combination with the finger-breadth and clock-face methods.

17. Instruction on Miniature Ranges.—Training in description and recognition of targets can be carried out on miniature ranges, as described in Sec. 72, para. 8 (ii).

Section 46.—Fire Orders.*

1. Words of Command.—The following words of command will be used as may be found necessary:

At—(*Elevation and deflection*).
At—(*Object*).

Fire or Rapid Fire	On which the firer will load, adjust his sights, aim and fire, deliberately or rapidly.
Cease Fire	On which fire will be discontinued, and the firer will bring the rifle to the loading position, recharge the magazine, and apply the safety-catch.
Rest	On which the safety-catch will be applied and an easy position assumed. When rifles are not provided with safety-catches, on the command "*Rest*" the cut-off will be pressed in, the bolt opened and closed, and the spring eased.
Unload ..	On which all cartridges will be removed from the chamber and magazine, and other motions performed as detailed in Sec. 27, para. 4.

* See also Sec. 54, para. 3 (vi).

2. Words of command in fire orders will be as few as possible. *They must be announced clearly and deliberately by fire-unit commanders, and repeated if necessary, should they notice by the actions of their men that they are not properly heard or understood.* If the noise of firing, the distance due to deployment of the unit, the wind, or other conditions prevent the hearing of orders, they must be passed from N.C.O. to N.C.O., from observer to observer, or from man to man.

3. As already stated, when possible, directions as to sighting as well as the target *will be given before the occasion for firing arises, and fire will be opened without further orders as soon as the target appears.* Orders for adjusting the sights should be given first, so that there may be no necessity for the firers to remove their eyes from the target after it is indicated, otherwise the order of the words of command is not of material importance.

4. Anticipatory Orders.—Fire orders should anticipate events as far as possible, so that lengthy orders will not be needed after the target appears. The following is an example of an anticipatory order, which includes the use of combined sights: *The enemy is about to advance from that fir-wood on the hill half left. When he moves, concentrate on the thickest part of his line*—1250 *and* 1350.

5. If all ranks are kept informed of the course of events,* and led to anticipate occasions for fire action, *there should be no need for any words of command other than those which*

* All subordinate commanders are responsible for keeping their respective superiors, as well as neighbouring commanders, regularly informed of the progress of events, and of important changes in the situation as they occur. All ranks should notice what takes place within their view and hearing, and report anything of importance accurately and at once to their immediate superior, who must pass the information on to the higher commanders and to neighbouring units. This is the foundation of co-operation in war, and is essential not only in battle, but at every stage of a campaign.—*Infantry Training*, 1914.

regulate movement, the opening and closing of fire, and the rate of fire ; and even these may be dispensed with if the firers are well trained, and combine their efforts according to orders issued in anticipation. *The results of observation and alterations to be made in sighting or point of aim must be notified at once.*

6. Instruction in Fire Orders.—Fire-unit commanders, observers, and N.C.O.'s should be thoroughly trained in giving clear, concise fire orders under practical conditions. They must watch to see if their orders are understood by the actions of their men. *Men must be trained not to put their rifles to their shoulders until they understand the orders given and recognize the target indicated.* This rule is essential *to prevent useless waste of ammunition in war,* and to serve as a check in peace training, as to whether orders are given or passed from man to man so that they are immediately understood and carried out by the men. It will enable fire-unit commanders to know when their orders are not heard or understood, and also enable company and platoon commanders to supervise the training of fire-unit commanders.

7. Passing Fire Orders from Man to Man.—(i) Soldiers are trained in passing short verbal messages and orders accurately and quickly as part of their field-training, and this instruction is contained in *Drill and Field-Training* of this series in Sec. 8 and also in Sec. 42, which deals with training in passing messages in whispers during night operations. Training in passing fire orders quickly and accurately from man to man is a vitally important part of the musketry training of N.C.O.'s, observers, and men. Orders passed from man to man in the firing-line must be short. They may be passed a sentence or two at a time, or as a whole, the latter being the best and quickest method if orders are short.

(ii) **Instruction in passing Fire Orders.**—Fire-units must be trained

thoroughly in passing fire orders, and this duty should be practised during extended order drill, and later during manœuvre, when units are deployed, and especially when they are firing with blank cartridge, so as to accustom men to listening to orders and passing them while firing and in the noise it involves. In practising passing orders from man to man, an N.C.O. should be told off to record orders passed from man to man as received at the end of a line to check their accuracy.

8. Instruction on Miniature Ranges.—Fire orders can be practised on the miniature range as described in Sec. 74, para. 4 (iii).

Section 47.—Fire Discipline.

1. Importance of Fire Discipline.—If full effect is to be obtained from the results of fire, a high standard of fire discipline in men is as important as skilful direction and control of fire by commanders.

2. Qualities Necessary for Fire Discipline.—Good fire discipline demands the following qualities in men:

(i) Strict attention to the signals and orders of the commander, combined with intelligent observation of the enemy.

(ii) Careful adjustment of the sight, economy of ammunition, and prompt cessation of fire when ordered or when the target disappears.

(iii) Power to endure the enemy's fire even when no reply is possible.

(iv) A cool and intelligent use of the rifle when the commander can no longer exercise control.

3. Rules for Fire Discipline.—In addition to the above qualities, men must be trained to carry out their duties according to the following rules:

(*a*) In collective firing no man will fire until he clearly

recognizes the target described by his commander, or without selecting a definite target in individual firing.

(*b*) In collective firing every man will press his trigger independently. *Bursts of independent fire are more effective than volleys.*

(*c*) As a rule fire should be delivered deliberately, but each man must always satisfy himself that every time he presses the trigger he will hit the object aimed at.

(*d*) If rapid fire is ordered, every man will fire at his own best rate for combining rapidity with accuracy.

(*e*) Each man will take care to pass orders carefully and accurately.

(*f*) Each man will make the best use of ground and cover, *primarily to increase fire effect*, and secondarily for concealment and protection. He must remember that the most important requirement, when firing from behind cover, is the ability of a man to use his rifle to the best advantage, and that *his eyes must be kept on the enemy between shots to avoid losing sight of targets.*

(*g*) *Each man must watch the front and remain alert and attentive while awaiting orders. He must open fire smartly when ordered to do so on such fleeting targets as troops in movement, and continue firing, unless otherwise ordered, while they present a favourable target during movement.*

(*h*) He must, when employing individual fire on the defensive, especially at shorter ranges, *mark down troops by noting their position on the ground or behind cover, and open fire the moment they expose themselves or rise up to advance.*

4. Working in Pairs.—Combined action is always more likely to be successful than isolated effort, and so long as control is possible the individual man must watch his leader and do his best to carry out his intentions. When, however, the section is under heavy fire, section commanders cannot always exercise direct control, and in these circumstances men should endeavour to work in pairs, in-

dicating targets and estimating the range for each other, firing steadily, observing the results of each other's fire, and husbanding their ammunition.

5. Ammunition.—If incapacitated from advancing, the soldier's first duty is to place his ammunition in a conspicuous place, ready to be picked up by other men, and all ranks must seize opportunities that offer for replenishing their ammunition in this manner.

6. Duty of Soldier when separated from Unit Commander.—If, when reinforcing the firing-line, or at any other time, a soldier loses touch with his section commander, it is his duty to place himself under the orders of the nearest officer or non-commissioned officer, irrespective of the company or battalion to which he may belong.

7. Training in Fire Discipline.—The foundation of training in fire discipline will be laid in the general training of the soldier, especially in the instruction which imbues him with the soldierly spirit, and develops his character in discipline and other soldierly qualities.* The recruit's instruction in aiming and firing and fire discipline will be carried out concurrently with his training in drill in both close and extended order, as laid down in the directions for the annual individual training of the soldier in *Infantry Training*, 1914, and other official textbooks. Training in fire discipline may commence when the recruit is sufficiently instructed in aiming and firing, and will be combined with training in extended order drill. *Fire discipline can only be taught by constant and systematic training.*

8. Exercises in Fire Discipline.—These exercises should be carried out progressively. In the preliminary stages of instruction men should be trained in squads, as already

* The methods by which the development of the soldierly spirit is inculcated in men, and their character developed in discipline and other soldierly qualities, are dealt with in Chapter I of *Drill and Field Training* of this series.

described in para. 9, the fire orders being simple and the targets easy to recognize. More advanced stages of instruction in fire discipline will be combined with the soldier's training in extended order drill and manœuvre (see Chapters III and VII of *Drill and Field Training* of this series), and also during advanced stages of musketry training. Thus training in fire discipline can be combined with field exercises consisting of tactical schemes in attack and defence, etc., when blank cartridge is used, and with fire direction and collective field practices fired with ball cartridge on field firing ranges.

9. Preliminary Exercises.—(i) In preliminary exercises the squad will be drawn up in line at one or two paces interval, and on the command from the instructor—*Sitting, Standing, or Kneeling, at* (range); *at* (object); *Fire* or *Rapid fire*—will perform the necessary motions, and continue firing until the order *Cease fire* or *Unload* is given. If no orders are given as to the firing position, the squad will assume the lying position. The standing, kneeling, and sitting positions will only be practised under conditions suitable to their employment.

(ii) If it is desired to change front or position, the instructor will give the necessary commands, but without as a rule causing fire to cease. All commands given during firing are to be passed down the line of firers, to practise them in passing orders, the orders being taken down at the of the line to check their accuracy.

10. When the squad has gained sufficient experience, the fire orders should be combined with those for movement, as in the following example, given to a section in fours: *Section, line that ridge—To the left three paces extend—At* 1,000*—At the enemy just left of that house on the hill, half left—Fire—Cease Fire—Advance.* In exercises carried out with blank ammunition, *the safety-catch will be applied,* or rifles will be *unloaded* or *sloped,* before a movement is

undertaken. In all fire discipline exercises the rule mentioned in Sec. 46, para. 6, regarding not bringing the rifle to the shoulder if they do not recognize targets, should be strictly observed by men for the reasons given.

11. Development of Individual Judgment. — In more advanced exercises, to develop individuality, the complete detail of commands will occasionally be dispensed with. Thus, on a target appearing suddenly for a limited time, the executive command *Fire* or *Rapid Fire* only will be given, on which each individual will adopt the firing position he considers most suitable to the tactical conditions, adjust his sight, and open fire. The instructor will observe and criticize the positions and the sighting of the rifles.

12. Instruction on Miniature Ranges.—Instruction in fire discipline can be carried out on miniature ranges during the Fire Direction Practices and Collective Field Practices contained in Sec. 74.

CHAPTER VII

GENERAL INFORMATION REGARDING RANGE AND FIELD PRACTICES

Section 48.—Preliminary Training.

1. Lectures.—The instruction contained in Chapters I to VI of this book is classified under the head of Preliminary Training, as it lays the foundation of the soldier's training in the use of the rifle, and prepares him for instruction in both range and field practices. Thus, preliminary training commences with information regarding the construction of the rifle and directions for taking care of the weapon and cleaning it, includes instruction in aiming, firing, visual training, and ranging, and concludes with standard tests in preliminary training and grouping practices on miniature and 30 yards ranges. An extremely important part of preliminary training consists of a systematic course of lectures given concurrently with practical instruction. These lectures will deal with the theory of rifle fire, important points in elementary training, and the tactical application of fire through fire direction and control, including the use of ground and cover, and the duties of fire-unit commanders and observers in the firing-line [see Sec. 74, para. 5 (iii)].

2. Recruits.—Although it is only by practice in shooting that a high degree of proficiency can be attained in the use of the rifle, the ammunition allowances are necessarily limited, and are calculated on the assumption *that firing will be preceded by a most thorough course of preliminary instruction.* Recruits, before they begin a course of firing, must reach a

satisfactory standard in aiming, and in holding their rifles steadily while pressing the trigger, otherwise range practice will merely result in waste of ammunition.

3. Trained Soldiers.—(i) *Besides thoroughly grounding recruits in elementary training, trained soldiers must also be kept efficient in their preliminary instruction.* Preliminary training in musketry exercises should therefore be continued throughout the year by trained soldiers. Skill in judging distance, a perfect trigger release, dexterity in the loading motions, and the habit of adjusting sights, cannot be retained without frequent practice.

(ii) It is therefore of the utmost importance that trained soldiers should develop by constant practice a habit of recognizing targets, judging their distance, adjusting their sights, and firing quickly but steadily without undue effort. It is advisable to test the ability of trained soldiers in the standard tests of preliminary training before they begin firing in range practices. Reconnaissance and ranging exercises will be a necessary preliminary to successful fire direction.

Section 49.—Tests of Preliminary Training.

1. Objects of Tests.—The tests of elementary training have been devised to fulfil the following purposes:

(i) Provide instructors with a means of testing recruits to insure that they have reached a sufficient standard before they begin range practices.

(ii) Insure that trained soldiers have retained their efficiency.

(iii) Prevent any detail of elementary training from being overlooked.

(iv) Provide a standard to be attained by technical and other troops who are unable to devote as much time as is desirable to elementary training.

2. Nature of Tests.—These tests are divided into *oral, inspection,* and *standard* tests. It is important that teaching should not be confused with testing. In the former a man is instructed by example and explanation; in the latter he is questioned, or ordered to carry out a certain exercise without any explanation or assistance, and either passes the qualifying standard or is relegated for further instruction.

3. Record of Tests.—A record will be kept for each man of the results of the various tests, which will be inspected periodically by the commanding officer. Extracts from these records will furnish useful guides as to efficiency when men are transferred to other companies or battalions. Men, particularly recruits, should themselves keep a record of their performances.

4. Oral Tests.—(i) **Care of Arms and Ammunition.**—A few questions should be put to each man on these subjects.

(ii) **General Theoretical Knowledge.**—A few questions should be put to each man regarding the theory of rifle fire and its practical application.

(iii) **Description of Targets.**—Each man separately should be called upon to describe one or two objects in a landscape, and be questioned as to shape, colours, sizes, units of measure, etc.

5. Inspection Tests.—(i) **Firing Positions.**—Every man should be inspected individually in all firing positions, and the existence of any of the following serious faults should be noted in a book for production at subsequent tests: (*a*) Firing from left shoulder; (*b*) eye near cocking-piece or thumb in aiming; (*c*) want of grip with either hand; (*d*) finger round trigger in loading position; (*e*) excessive constraint of the limbs, body, or head in firing.

(ii) **Fire Discipline.**—Men should be tested for ability to execute orders for fire direction and control rapidly and correctly, including accurate adjustment of sights after each

advance in attack, and after every advance of the enemy—represented by fatigue-men—at distances between 600 and 1,400 yards.

6. Standard Tests.—(i) **Regulation Aim.**—To be tested by triangle of error. *Standard—No side of a triangle to be over one-third of an inch, or the centre of the triangle more than one-third of an inch from the instructor's aim.*

(ii) **Trigger-Pressing.**—Trigger-pressing will be tested by means of the aim-corrector.

(iii) **Adjustment of Sights.**—Several distances will be named and sights examined after three seconds [M.L.E. rifle, five seconds].

(iv) **Aiming-Off for Wind or Movement.**—Tests in aiming-off for wind. The men will be ordered to lay their rifles on a point at some number of feet, not exceeding 6, right or left of a fatigue-man. One foot of error only, measured from the regulation point of aim, will be allowed. Allowance in aiming-off for wind or movement will be tested with the aim-corrector, the percentage of serious errors being recorded.

(v) **Rapidity of Aim.**—The time required to bring the rifle from the loading position to the shoulder, on the command *Fire*, and to align the sights on an aiming disc held to the eye, will be measured with a stop or ordinary watch with a second-hand. Lying position.

The instructor will stop the watch when the trigger is pressed, provided he is satisfied with the aim. *Standard time, four seconds.*

(vi) **Rapid Loading.**—The men to be tested will be equipped with a bandolier, pouch, or cartridge pockets, and six chargers filled with dummy cartridges. The chargers will be placed in the pouches or pockets, which will be buttoned over them. The time required to load, close the bolt, eject the cartridges, the rifle being held in the correct loading position, one charger being inserted at a time, the

pouch or pocket, whether empty or not, being buttoned up every time a charger is withdrawn, will be noted. *Standard time, one minute.*

(vii) **Rapid Firing.**—This will be a combination of (v) and (vi). On the command *Rapid fire*, each man will load with dummy cartridges in chargers from the pouch or cartridge pocket, the pocket being buttoned up each time a charger is withdrawn, and aim ten rounds at an aiming disc held to the instructor's eye. If the aiming is unsatisfactory, the test will be repeated more slowly. The time required will be noted. *Standard time, one minute.*

(viii) **Eyesight.**—To be carried out in conjunction with Standard Test (iii). Four fatigue-men as " points " should be placed under cover in various directions and at different distances, not exceeding 800 yards. The men to be tested lie down extended to two paces. Each point is called up by signal.

The fatigue-man stands, kneels, or raises his head, according to the degree of visibility required, and fires four rounds of blank ammunition in half a minute, then returning to cover. During the half-minute the observers adjust their sights and place their rifles at arm's length to the front.

At the end of the half-minute a whistle is blown, and those men who have failed to discern the point are noted, while non-commissioned officers record the elevations found on the sights in connection with Standard Test (x).

In every case the point should be signalled to rise a second time in order that his position may be shown to those men who previously failed to see him, and half a minute should then be allowed to these men to adjust their sights for Standard Test (x). Failures must not exceed one per man, but consideration must be given to the visibility of the points.

(ix) **Recognition of Targets.**—The men to be tested should

each have an aiming-rest or sandbags for laying aim. A non-commissioned officer from behind them will describe some difficult aiming-point, such as a point in a hedge or area of open ground. The men aim their rifles at the point which they recognize from the description. Four points should be described for every man tested.

(x) **Judging Distance.**—The distances of four standing fatigue men should be judged at distances not exceeding 800 yards.

(xi) **Grouping with Miniature Cartridges.**—For regular troops, the grouping standards for miniature cartridge practice at 25 yards will be: Marksmen, 1-inch ring; 1st Class, 2-inch ring; 2nd Class, 3-inch ring.

Section 50.—Progression of Instruction in Range and Field Practices.

1. After the soldier has been trained thoroughly in elementary instruction in aiming and firing, and has passed the oral inspection and standard tests of preliminary training satisfactorily, he may be considered fit to commence range practices, with which his instruction in individual and collective firing will begin. The progression of this instruction may be divided roughly into the following stages:

(i) **Individual Firing.**—(*a*) Instruction on miniature ranges and 30 yards ranges.

(*b*) Range practices.

(*c*) Individual field practices.

(ii) **Collective Firing.**—Collective field practices.

2. Instruction on 30 Yards and Miniature Ranges.—Instruction on 30 yards ranges is dealt with in Sec. 55, Instruction on miniature ranges is dealt with fully in Chapter X, which contains directions for firing elementary and instructional range practices, as well as individual and collective field practices on these ranges.

3. Range Practices.—Range practices consist of the following practices and stages of instruction:

(i) **Practices.**—(*a*) *Grouping.* (*b*) *Application.* (*c*) *Snap-shooting.* (*d*) *Rapid Firing.*

(ii) **Stages of Instruction.**—The above practices are arranged in a series of tables for recruits and trained soldiers, demanding a gradually increasing degree of skill on the part of the firer, and are divided into the following stages of instruction:

(*a*) *Qualifying Practices.* (*b*) *Instructional Practices.* (*c*) *Classification Practices.*

4. Field Practices.—Individual and collective field practices are dealt with in this chapter and in Chapters VIII and X. The general programme of field practice should be arranged as follows:

(i) Individual field practices.

(ii) Fire direction practices.

(iii) Collective field practices, divided into—

(*a*) Exercises for sections and platoons in fire direction and application of collective fire.

(*b*) Standard tests of collective grouping and fire effect.

(*c*) Comparative demonstrations of fire effect and vulnerability.

(*d*) Exercises for companies designed to reproduce service conditions as far as possible, and to illustrate tactical principles.

(iv) Combined field firing (see *Musketry Regulations*).

Section 51.—Range Practices.

1. When recruits have shown clearly that they have acquired a satisfactory standard of skill in all branches of preliminary training, they will commence range practices. *Range practices merely lay the foundation of musketry in its elementary stages.* They are only a means to an end—namely, to prepare soldiers for field practices, by which

they are trained to fire under conditions approximating as closely as possible to those of service.

2. Qualifying Practices.—The range practices for the Regular Army and Special Reserve begin with qualifying practices, for which standards are prescribed. *If these standards are not attained, it is a sign that the preliminary training has failed in its object.* After passing standard tests in miniature range practice, and firing on the 30 yards range, every man should begin his practice on the open range confident in his own powers, and determined to prove his ability to hit.

3. Preliminary Training and Range Practices.—Instructional range practices need not be continuous. Intervals of time between the exercises are often beneficial, especially to nervous men; but in any case, time should be found to continue the exercises of preliminary training on days allotted to range practices, in order that there may be no separation between theory and practice.

4. Scope of Range Practices.—(i) In range practices the soldier should attain a high standard of skill in shooting at known distances under easy conditions and in various positions, at large vertical targets easy to see, and furnished with scoring or approximation rings, which enable the error in shooting to be expressed in figures convenient for comparative purposes.

(ii) He will confirm in practice the lessons learned in preliminary training, and be thoroughly acquainted with the peculiarities of his rifle. He will fire in the open and from behind cover in deliberate and rapid practices, and will learn the rate of fire which, in his own case, best combines volume with accuracy. In snapshooting he will realize the necessity for rapid alignment of sights, and the value of time in taking advantage of targets exposed under service conditions.

5. Hints to Instructors—(i) **False Standards.**—Instructors must guard against the danger of men setting up false

standards of musketry based on the results of their shooting in range practices. Lectures based on the instruction laid down in Sec. 11 may be given to recruits at the commencement of or during range practices, so that they clearly understand that the assurance of effect in battle through individual fire is limited to distances within close range, and that collective fire is necessary for fire effect beyond close range.

(ii) **Deliberate Practices.**—Instructors must bear in mind that deliberate practice at bull's-eye targets tends to inculcate a slow method of shooting, as minute attention to changes of wind and light, and fine adjustments of the backsight based on shot-by-shot marking, are necessary to produce the best results under such conditions. Therefore, directly recruits have attained a satisfactory degree of skill at deliberate practices, they must commence snapshooting and rapid firing. *Instructors must make it clear to soldiers that high scores in range practices under easy conditions and shot-by-shot marking bear no relation whatever to the results to be expected from their skill when firing under service conditions even in peace time.*

(iii) **Range Practices and Service Conditions.**—In battle at close range fire effect depends on snapshooting and rapid firing under conditions in which the effect of wind and light may usually be disregarded; alteration of sights is seldom possible, and the result of fire is frequently impossible to ascertain by observation. Beyond close range in battle, accurate ranging, allowance for deflection due to wind, and observation of fire, which are all necessary for accurate individual firing, are beyond the powers of unassisted individuals, even when targets are easy to discern and recognize with the naked eye, which is not ordinarily the case.

(iv) As the conditions of range practices differ in all these important respects from those of service, it is clear

that another and extremely important stage of training, for which range practices are only a preparation, must be carried out before the soldier can be considered fit to perform his duties in the firing-line efficiently. This further stage of training is known as " field practices."

(v) **Standard of Accuracy.**—There is no object in establishing a phenomenal standard of accuracy in elementary range practices and deliberate shooting. A satisfactory degree of proficiency is soon attained by the majority of men, and they should then proceed to snapshooting and rapid firing practices. *It is in snapshooting and rapid firing up to 600 yards that a very high degree of proficiency is desired.*

(vi) **Faults of Aim.**—Although instruction on the firing-point is an indispensable form of musketry instruction for young soldiers, if it leads to continual alterations of sighting to meet errors in shooting, the firer is confirmed in his errors, and his faults are only obscured. *During the firing the instructor should watch the recruit, not the target, and should insist on being told the probable result of the shot before it is signalled.*

(vii) **Firing Positions.** — No departure from correct firing positions should on any account be permitted. The rifle must be gripped firmly, the face kept back from the right hand, and there should be no constraint in the position of the body.

(viii) **Breathing and Let-Off.**—The management of the breathing and the let-off must be noticed, and the recruit reminded of them continually, so that his mind may be centred on the more important details of shooting, and not on changes of wind or light, with which he will become familiar later.

(ix) **Dwelling on Aim.**—Although care and deliberation are necessary in elementary firing instruction, recruits must not be allowed to fall into the habit of dwelling on their aim nor of aiming and returning to the loading position repeatedly before pressing the trigger. These errors arise

chiefly from taking a fine sight, and focussing the eye on the foresight instead of on the target. When such methods are adopted, it is a sign that the object of range practices is misunderstood, and that the firer is in need of more practical instruction.

(x) **Shock of Discharge.**—In preliminary training the recruit has not accustomed himself to the shock of discharge. In some cases there is extreme difficulty in overcoming the tendency to flinch from this shock, and this is one of the commonest causes of inaccurate shooting. Men who flinch should not proceed with firing practice. The cause of the flinching can be detected, and can sometimes be removed after one or two rounds only.

(xi) **Important Points for Instructional Practices.**—The following are important points to remember with reference to range practices:

(*a*) That best instruction available must always be given.

(*b*) One instructor can only watch and instruct one man at a time.

(*c*) No hurry should be allowed. It is better to discuss the reasons for failure of a few shots thoroughly than to hurry over many.

(*d*) The first shot is the important one, and from the result of it the others must be applied to hit the mark.

(*e*) A true declaration of the point of aim when the shot was actually fired must be made immediately after firing.

(*f*) The firer or his rifle should never be touched. He should be made to correct his position and alter his own sights, etc., as required.

(*g*) The firer should not be told the reason for his faults until he has first been questioned regarding them, and made to reason out for himself the causes and remedies for failure.

(xii) **Measures to prevent Faults becoming Habitual.**—It is a common experience that serious faults become formed

habits in recruits before they are discovered by the instructor, and that they are exposed only after repeated visits to the range, by which time it will be difficult to correct them. In order to compel analysis of faults, to indicate clearly how defects may be remedied, and to remove all suspicion as to the accuracy of his rifle, preliminary and qualifying practices are divided into exercises in (*a*) grouping, and (*b*) applying fire.

Section 52.—Grouping and Application.

1. Definition of Grouping.—The term " group " as applied to a number of shots fired at an objective has previously been explained. Grouping practices consist of firing a series of shots—usually five—at a distinct and fixed aiming mark without any alteration of sighting or point of aim.

2. Object of Grouping Practices.—The object of grouping practices is not to score hits on the mark aimed at, but to develop in men the power of grouping a series of shots as closely as possible. In other words, the object of these practices is to teach soldiers to shoot steadily and consistently as the foundation of their training in rifle-shooting. When they are able to fire so that their shots are grouped closely together, their training will be advanced another stage to application practices, when they will be taught to " apply " their shot groups to an aiming-mark. That is to say, they will be taught to hit the mark aimed at, as well as to group their shots closely.

3. Testing the Value of Groups.—Thus, in grouping practices, the position of a shot group in relation to the aiming-point is no test of its value, which is judged only by the closeness of the shots in each group. Shot groups are measured by rings, as described in Sec. 56, para. 2, and in Sec. 49, para. 6 (xi) (Miniature Ranges).

4. Point of Mean Impact.—(i) When all the shots in a group are contained in a measuring-ring, the point where the centre of the ring falls on the target is termed the *point of mean impact.* The position of the group in relation to the point of aim is decided by recording the distance and direction of the point of mean impact from the point of aim. As already stated, the position of the group in relation to the point of aim is immaterial, and it does not matter if all the shots miss the point of aim. Nevertheless, the position of the point of mean impact in relation to the point of aim is important for instructional purposes, because it indicates the constant faults of the firer and errors of the rifle.

5. Faults of Firer shown by Shot Groups.—For example, a very small group well placed shows consistency of aim, trigger-pressing, and holding. If badly placed, it may show inaccuracy of the rifle, or a constant error in aiming. A group dispersed vertically on the target shows vertical variation either of the amount of foresight, or of the point of aim ; whilst a group dispersed horizontally shows incorrect centring of the foresight in the notch of the backsight, or horizontal errors in aiming. A group low left may show forward movement of the shoulder; and one low right may show jerking the trigger, and high right flinching. These faults, however, can only be ascertained *if the firer has been watched closely whilst firing.*

6. Analysis of Faults.—(i) Thus, grouping practices are valuable for discovering and correcting the faults of the firer at the commencement of his instruction on the range. Instructors should carefully note the positions of good groups as well as bad ones, for some constant error in aiming or fault of the rifle may thus be discovered, which will escape notice in application practices when every shot is signalled, and error is attributed to wind or other causes for which allowance is easily made in sighting. Such errors

are not uncommon even among marksmen, and often affect their shooting unfavourably in field practices when the result of each shot is not signalled.

(ii) **Testing Rifle for Faults.**—Should a soldier make a bad group, and the rifle is suspected, it should at once be fired under similar conditions by a reliable marksman. Should the marksman also make a bad group with the rifle, the rifle should be tested according to the rules laid down in *Musketry Regulations*, and, *if found inaccurate, the man to whom the rifle belongs should be allowed to recommence the course, the necessary ammunition being found from the authorized allowances.* If the rifle is proved accurate, the soldier's aim should next be tested by the triangle of error, and his let-off should be tested by means of the aim-corrector. His eyesight should also be examined.

(iii) **Faults due to Nervousness, etc.**—If no other cause for constant faults can be discovered, unsteadiness may be traced to illness, to some habitual excess, such as cigarette smoking, to lack of determination, or to nervousness due to some natural or exciting cause. If faults are found to be due to nervousness or lack of will-power, the best remedy lies in developing the power of nerve and muscular control through physical exercises which develop these powers.* Rope-climbing is a good exercise for developing nerve and will-power.

(iv) **Faults due to Firing Position, Eyesight, etc.**—Faults may sometimes be remedied at once by correcting the fire positions, by allowing time to elapse between the shots, or by snapping practice. Some men can aim quickly, but lose their power of seeing objects well defined if the eye is strained by dwelling on aim. Thus, the cause of the failure may sometimes be due to the firer's effort to succeed. By dwelling too long on aim the muscles of the eye become tired, the vision becomes blurred, and the will-power is impaired.

* See the *Physical Training* books of this series.

It is necessary to take time in overcoming difficulties in such cases. In serious cases the soldier should be examined medically with a view to discharge, or the provision of proper glasses.

(v) **Record of Analysis of Faults.**—A complete analysis of the faults of the firer and his rifle should be made before leaving the range, and a note should be made on the register of the steps decided upon for remedying defects.

7. Application Practices.—(i) When a man has acquired sufficient skill in aiming and trigger-pressing to make a good group with certainty, he will commence application practices. These teach the firers to adjust their sights and point of aim so as to apply the result of their groups to an aiming mark.

(ii) Application practices should be fired first at bull's-eye targets similar to those used for grouping, but when once a man becomes proficient at these easy targets, figure targets should be used. Figure targets have been devised to accustom men gradually to the difficult targets which will be found in war, and also to counteract the following faults: (*a*) Taking too long an aim; (*b*) taking a fine sight; (*c*) focussing the eye on the foresight instead of the target at the moment of firing. *All these are common errors when a bull's-eye target is used.*

(iii) Grouping standards may in some cases be attached to application practices in order to emphasize the importance of care and consistency in shooting. In application practices instruction is given in making allowance for atmospheric influences, chiefly cross-winds; but it is not desirable that trifling changes of wind should be met by minute adjustment of the wind-gauge. The instructor should call upon the soldier to estimate the wind before firing, and tell him the corrected allowance which he is to place on his sights. Subsequent alteration should be unnecessary. *In application, and, in fact, any practice, small*

adjustments of sights should be discouraged. The point of aim should be varied as may be found necessary to counteract any error of the rifle.

Section 53.—Snapshooting, Rapid Firing, and Firing at Crossing Targets.

1. Snapshooting.—(i) Snapshooting means firing an effective shot in the shortest possible time, and necessitates—

(*a*) Watching the front.
(*b*) Quickness of aim.
(*c*) Observation of the strike of the bullet, when possible.
(*d*) Loading immediately after firing.

Snapshooting may follow application practices, and in the early stages it is advisable to use the figure-targets used for these practices, which can be exposed for any length of time to suit the skill of the firers at different stages of training. Six seconds is sufficient in the early stages, and this may be reduced to four or three seconds as progress is made.

(ii) **Snapshooting from Cover.**—In snapshooting practices from cover, not only the exposure of the target, but also that of the firer, should be limited. Strict attention must be paid to adapting the firing positions correctly to cover, and to firing with the least possible movement and exposure.

(iii) **Snapshooting on Miniature Ranges.**—Practices in snapshooting on miniature ranges will be found in Chapter X.

2. Rapid Firing.—(i) Rapid fire, which has been dealt with in previous sections, means firing as many rounds as possible with reasonable accuracy in a given time. This method of firing shows the best rate of individuals, and brings out the necessity for clean and quick loading and manipulation of the bolt, with the butt to the shoulder, combined with

quickness of aim. The best rate of fire depends in every case upon the degree of training of the individual and the size and visibility of the aiming-mark. In rapid firing a man of normal temperament should be able to attain the regulation rate with trifling loss of accuracy, but *it is not desirable to make a great sacrifice of accuracy to produce even the regulation rate.*

(ii) Dexterity of loading and a habit of rapid alignment of the sights should be developed in preliminary training. In the range practices the opportunity is afforded to every man to ascertain his own best rate for combining accuracy in shooting with rapidity of fire so as to produce a high average of hits per minute, but there is no obligation to fire all the rounds allotted in any rapid practice.

(iii) **Rapid Firing on Miniature Ranges.**—Instructions for carrying out rapid firing practices on miniature ranges will be found in Chapter X.

3. Firing at Crossing Targets.—As already stated, practices in firing at crossing targets can be carried out economically and with good results on miniature ranges. Practices in firing at crossing targets are contained in Chapter X.

Section 54.—Field Practices.

1. Scope of Training.—(i) Field practice consists of firing at service targets at unknown ranges under conditions approximating as closely as possible to those of service. In field practice every care should be taken to develop further the skill already acquired in snapshooting and rapid firing in instructional practices. The nerve control gained in deliberate shooting should be supplemented by vigour and alertness, deftness in loading, the habit of correct action under distracting conditions, and skilful use of cover, based on the determination to make fire effective.

(ii) There must be further training in picking up an indis-

tinct target, such as is likely to be presented in war, in estimating its range, in rapidly opening fire, and in making the best use of ground. Every individual must learn to recognize the distances at which individual fire will be effective, and to act in co-operation with his comrades.

(iii) Officers and fire-unit commanders must be practised in their duties of direction, control, and observation of fire, in the use of ground, and in mutual support. With these must be combined the study of the results to be obtained from the delivery of concentrated fire at targets representing troops in different formations, and on ground of varying character, in order that practical experience may be acquired of the principles which govern the employment of fire in the field.

(iv) Under the conditions of peace manœuvres with blank ammunition, fire control may be neglected, targets may be insufficiently described, and it is not known whether the firers recognize them, distances are sometimes roughly guessed, sights are not always adjusted, and men aim carelessly. Unless, therefore, tactical exercises are conducted sometimes with ball ammunition, there will be a want of realism in training during peace time.

2. Individual Field Practices—(i) **Progression of Training.**—Training in individual field practices may be carried out in the following stages: (*a*) Snapping at vanishing figures without firing; (*b*) practices on miniature ranges, or 30 yards range with Solano or other figure targets; (*c*) individual field practices on open ranges.

(ii) In the individual practices each firer will be provided with a separate target. He will learn to fire at unknown distances, depending on the observation of a comrade for information as to the result of his shots. He will fire at targets representing an advancing enemy, and will advance himself, firing at each halt. He will learn to use ground for fire effect and cover, to pass all orders and infor-

mation received, to recognize the limits for effective individual fire, and the principles which govern the choice of targets in individual fire.

(iii) It will be well to conclude the individual field practices with a demonstration of the comparative inefficiency of individual fire at distances beyond 600 yards. This may be effected by detailing individuals to fire at low service targets, and noting the time required to produce any required effect, and then applying collective fire at the same targets under proper direction and control of fire leaders, equipped with field-glasses.

(iv) **Points for Criticism.**—Instructors should note the following points for criticism, besides faults connected with any lessons taught in the course of elementary training:

(*a*) Correct use of ground and cover, and correct method of resting rifle when possible.

(*b*) Watching the front and quick location of targets, including marking down.

(*c*) Accurate judging distance within close range.

(*d*) Quick opening of fire and rate of fire.

(*e*) Instant reloading after firing.

(*f*) Reloading magazine as opportunity occurs.

(*g*) Co-operation when working in pairs, including the following points: (1) Consultation as to choice of targets; (2) hesitation in opening fire and settling who shall fire and who shall observe; (3) whether observer reports results of shots accurately.

(v) **Justification for Opening Fire.**—Men will be trained in individual field practices to use their judgment as to opening fire. Tendency to open fire prematurely must be checked, and men must be taught to watch for favourable targets and good opportunities so as to enable them to obtain the fullest effect from fire.

(vi) **Choice of Targets.**—Men must also be trained to choose their targets so as to obtain the fullest effect from fire—that

is to say, they must choose the most favourable target presented at any moment.

3. **Fire Direction Practices.**—(i) Just as the men have been trained in progressive stages in preliminary training, range practices, and individual field practices, so fire-unit commanders must be practiced thoroughly in fire-direction, and make a careful study of it before undertaking the direction of collective field practices.

(ii) These practices are useful for training officers and N.C.O.'s in simple problems connected with the tactical application of fire, and to illustrate clearly that fire effect depends on (*a*) correct estimation of range, (*b*) fire orders being clearly given, correctly understood, and instantly obeyed. In other words, these practices serve to prove that good fire direction and control and fire discipline are essential for fire effect beyond close range.

(iii) **Progression of Training.**—Fire direction practices may be carried out in the following stages: (*a*) On the Solano Target, or landscape targets, without firing; (*b*) on miniature and 30 yards ranges, with ·22 and ·303 cartridges on Solano Target, or landscape targets; (*c*) on open ranges at distances beyond 600 yards.

(iv) At the conclusion of the fire-direction practices, all fire-unit commanders should be familiar with the effects of winds and temperature in shooting at 500, 1,000, 1,500, and 2,000 yards. The range tables should be studied, and lectures given on the influence of ground, ranging errors, and other details of fire direction.

(v) **Concentration and Distribution of Fire.**—Fire-direction practices will afford opportunities for training fire-unit commanders in the concentration and distribution of fire (see Sec. 44, paras. 8 and 9). Fire should generally be concentrated against very vulnerable targets, or when it is required to produce great effect at a particular point; it should be distributed when it is required to disturb the enemy's

aim along a portion of his front in order to assist movement.

(vi) For example, a company commander wants to produce great effect at a particular point, so he concentrates the whole of his fire on it; or he wishes to strike the enemy's line in two, four, or eight places, and orders: *By platoons*, or *By sections*, when the commanders of these units each select an aiming-mark for their unit in the enemy's front corresponding to the position of their own unit in the company. Should the company commander wish each man to select his own aiming-mark in the enemy's line corresponding to his own position in the company, he orders: *Distribute fire.*

(vii) The chief guides in deciding on the amount of distribution to be employed will be the visibility of the aiming-marks, the volume of fire available, and the range. In the absence of clear aiming-marks service targets usually consist of large scattered groups, which require a greater volume for assurance of fire effect. The greatest distribution of fire occurs when each man selects his own aiming-mark. Such distribution will not as a rule be employed beyond 600 yards, owing to the difficulty at longer ranges of finding sufficient aiming-marks.

4. Collective Field Practices.—(i) Collective field practices are primarily intended to afford the commanders of fire units practice in their duties of direction and control of fire. With this must be combined the study of the results to be obtained from the delivery of fire at targets representing troops in different formations, on ground of varying character, in order that practical experience may be acquired of the principles which govern the employment of fire in the field. *Any omission or neglect in fire direction, as well as any failure to adjust the sights, should, at this stage of training, be regarded very seriously.*

(ii) **Progression of Training.**—Training in collective field

practices will be carried out on the following stages: (*a*) On the Solano Target, or landscape targets, without firing; (*b*) on the miniature, or 30 yards range with the Solano Target, or landscape targets; (*c*) on the open range.

(iii) **Points for Criticism.**—The principal points to be considered in collective field practices are:

(*a*) The choice of targets.
(*b*) The justification or necessity for opening fire.
(*c*) The volume of fire required to effect the object in view.
(*d*) The method of ranging and error of the day.
(*e*) The orders for fire direction.
(*f*) Timing of movement.
(*g*) Mutual support.
(*h*) Regulation of volume of fire.
(*i*) Concentration or distribution of fire.
(*k*) The description and recognition of target and aiming-point.
(*l*) Skilful use of ground and cover.
(*m*) Reinforcement.
(*n*) Ammunition supply.
(*o*) Mutual assistance.
(*p*) Passing of orders and information.
(*q*) Communication with flanks and rear.

NOTE.—With respect to (*a*) and (*b*), all opportunities for delivering enfilade, oblique, or converging fire should be seized, together with opportunities for bringing a crushing volume of fire to bear on favourable targets and at critical moments. Further important points which may be considered in collective field practices are the necessity for searching or distribution in depth and the probable dispersion of the cone of fire.

(iv) **Tactical Schemes.**—*Section and Platoon Exercises.*—The earlier exercises for the smaller fire units will be carried out

under simple tactical schemes framed by the company commander, and arranged so as to give a progressive training to all ranks engaged. Schemes will be so drawn up as to give separate instruction in each phase of the combat, rather than to combine in each exercise all the operations included in the execution of a successful attack. They will also be designed to illustrate the various situations which may be expected on active service. They should test the proficiency of leaders in making fire effective on first opening and in regulating the volume of fire in accordance with the situation. Mutual support and combined action should be frequently practised, with and without the exercise of control. (See *Musketry Regulations*, Sec. 98.)

(v) **Company Exercises.**—*Combined Field Firing.*—When all the fire-unit commanders have shown proficiency in fire direction and control, companies will be trained to fire collectively against firing-lines at effective ranges. The leaders will be exercised in judging distance, in describing targets, and in concentration or distribution of fire. Great weight will be attached to the accurate passing of orders and information, and to the quickness of the men in recognizing their targets and applying fire. (See *Musketry Regulations*, Sec. 101.)

(vi) **Criticism of Collective Field Practices.**—At the conclusion of a collective field practice, in addition to criticism of the conduct of the exercise, there should be a conference as to the conclusions to be drawn from the results. For this reason a complete record must be made of the targets and conditions; the figures showing results must be carefully and fully tabulated.

The criticism of the conduct of the exercise should be complete, and should deal with the application of the tactical principles laid down in the Training Manuals, as well as with the application of the principles contained in these regulations. In appreciating results, chief attention should be paid to the successful or unsuccessful result of the

first application of fire, since surprise effect is all-important, and correction of sighting by observation is rarely possible in war.

(vii) **Results of Firing.**—The percentage of hits to rounds fired is an index to the steadiness of the firing only if the fire direction has been proved to be satisfactory. If the fire direction fails, the more accurate the shooting the fewer will be the hits recorded. In considering the results of fire, the percentage of loss inflicted on the enemy within a limited period of time is the best means of judging the value of the fire.

For general comparison of the collective fire results of units, the average number of hits per man per minute should be calculated if fire was concentrated, or the average number of figures hit per man per minute if it was distributed, but due regard must be paid to the justification of the rate of fire as indicated by the scheme.

CHAPTER VIII

CONDUCT OF RANGE AND FIELD PRACTICES

Section 55.—Thirty Yards Ranges.

1. When no classification range is available, elementary practices with service ammunition may be carried out on a 30 yards range. Such practice will render recruits familiar with the discharge of the rifle, and improve their trigger release under easy conditions. No practice will take place unless an officer or experienced serjeant is present.

2. Precautions for Safety.—All precautions for safety will be taken. Loading, in all positions except lying, will be carried out with the rifle held just above the waist, and the muzzle directed towards the target. *Charging or uncharging magazines is not to be carried out with the muzzle pointing upwards.*

3. Practices.—Practice at vanishing, moving, and landscape targets can be carried out as on miniature ranges, but with service ammunition. Long-range sighting-targets should be provided as a means of ascertaining the error of the rifle, and practice may be carried out with long-range sights.

Section 56.—Grouping Practices.

1. One firer will be detailed to each target, and fire five shots, maintaining the regulation point of aim throughout Targets will be changed, and a second detail of men will fire

similarly. Both details will then proceed to the targets, see their groups measured, and note the positions of the points of mean impact with reference to the points aimed at. If it is impracticable to proceed to the targets, the group may be marked by means of small spotting-discs (see also Appendix, VI, para. 2, note 3).

2. Rules for Measuring Groups.—(i) The groups will be measured with wire rings, 4, 8, and 12 inches in diameter, counting 25, 20, and 15 points respectively; 10 points will be allowed for a 12-inch group with one wide shot.

(ii) The ring which will contain all the shots will be recorded as the measure of the group. A shot-mark is included within a ring when it cuts the circumference of the largest circle which can be described within that ring by means of a pencil held at right angles to the target.

(iii) All shot marks found on a target will be included in the group to be measured. No points will be allotted to a group unless there are five shot-marks at least on the target. If more than five shot-marks are found on the target, there will be no score, and the practice will be repeated.

(iv) **Point of Mean Impact.**—When the ring is placed to include all the shots, the centre of the ring will be taken as approximately the point of mean impact. Its distance from, and direction with reference to, the point aimed at will be recorded on the register—*e.g.*, 7 inches, four o'clock.

(v) On return to the firing-point other details will fire, but steps will be immediately taken to ascertain the cause of any bad shooting of men in the first two details.

3. Third-Class Shots.—As a rule, third-class shots should not be allowed ammunition for further training in application practice until a satisfactory standard in grouping has been attained. This may be fixed at a ring of diameter equal to one-three-hundredth of the range, but officers should exercise their discretion as to allowing one wide shot in five when dealing with young soldiers.

Section **57.**—Timed Practices.

1. Deliberate Practices.—In deliberate practices, twenty seconds is the time limit allowed for each shot, reckoned from the act of loading. If there is a tendency to exceed the limit, a whistle should be used to mark the beginning and end of each period, but not otherwise.

2. Timed Exposure of Targets.—The timed exposure of targets for snapshooting and rapid fire practices will be reckoned from the time when the target is in position and stationary to the time when it is again moved for lowering. The movements of raising and lowering must be conducted with the utmost rapidity, but without jarring the target frames.

3. Timing in Rapid Practices.—(i) Timing in rapid practices should be reckoned from the word of command "*Rapid Fire,*" and fire should be stopped by the command "*Cease Fire.*" The command "*Rapid Fire*" should be given as soon as the target appears. The target should be lowered at the end of the time allowed for firing under orders of the officer on butt duty, but the officer superintending at the firing-point should also time the practice and order "*Cease Fire*" at the end of the time allowed for firing, reckoned from the command "*Rapid Fire.*" Four points will be deducted for every shot fired after the order to cease fire has been given.

(ii) **Charging Magazine in Rapid Practices.**—In rapid practices, unless otherwise stated in the "Instructions for the Conduct of the Practice," the magazine will be charged with four rounds, and the rifle will be loaded before the target appears.

4. Firing from Cover.—(i) In firing from behind cover, the position adopted must be such as would enable the firer on service to obtain the fullest protection from the cover, having due regard to the efficiency of his fire. In

the prone position, the grip of the left hand must be maintained on the rifle, and there must be no undue exposure of the shoulder or legs.

(ii) In firing from behind cover, the butt of the rifle will be in contact with the ground, and the firer will remain in observation, but otherwise completely covered, until the command "*Rapid Fire*" is given in rapid-firing practices, or the target appears in "Snapshooting" and "Crossing-Shot" practices. When snapshooting or firing rapid in the open, the rifle may be held in the loading or aiming position, as preferred.

5. Jambs.—In the event of a jamb occurring in a timed practice, and provided that it is not caused by any fault on the part of the firer, the time allowed for the practice will be increased to the extent due to the delay caused thereby. Should, however, a jamb in a rapid practice be due to a breakage of mechanism or other defect that cannot readily be rectified on the range, the whole practice will be fired again.

6. Missfires.—In the event of missfires, extra rounds will be allowed equal to the number of missfires in the practice concerned, a proportionate part of the time allowed for the whole practice being given for each extra round.

7. Extra Time.—Whenever extra time is allowed for a timed practice, a report giving the reason, and stating whether the jamb or missfire was due to the rifle or to the ammunition, will be rendered to Command Headquarters.

Section 58.—General Rules for Range Practices.*

1. Range practices, unless otherwise ordered, will be fired in drill order. Range practices should be fired, as far

* The range duties of officers supervising range practices, together with directions for signalling hits, etc., will be found in *Musketry Regulations.*

as possible, in favourable weather. It is of the utmost importance that recruits' firing should not take place in cold and unsuitable weather.

2. Order of Practices.—Range practices should as a rule be fired in the order in which they appear in the tables, but brigade commanders may vary the order at their discretion. When deliberate and rapid practices for classification are fired at the same distance, each man may fire the rapid practice immediately after the deliberate practice.

3. In the case of ranges of less than full extent, general officers commanding-in-chief may frame special instructions, make proportionate changes in the size of targets, and vary the points for classification.

4. Distribution of Ammunition.—(i) *The general distribution of ammunition laid down in the several parts of Tables A and B respectively should be adhered to.* In the Regular Army and Special Reserve not more than fifteen rounds should be fired in one day, except in classification practices, when twenty-five rounds may be fired, if necessary. It is always better, when time is pressing, to reduce the number of rounds fired in instructional practices than to hurry through them. All available officers should be present at the firing-points during instructional practices.

(ii) **Forfeiture of Rounds.**—Omission to fire the rounds allotted and failure to fire during an exposure or run in vanishing and moving practices will entail forfeiture of the rounds that should have been fired, and misses will be recorded for them. Ammunition required for repetition of qualifying practices will, when necessary, be taken from the surplus.

5. Firing Positions.—In range practices the regulation positions are obligatory, except in firing from cover, when the rifle should be rested and the position adapted to the ground. This includes resting the arm as well, if suitable,

but the cover is not to be specially constructed as a rest for the rifle.

6. Commencing Practice.—No man will load, or assume a firing position, until the senior officer present has ordered the practice to commence. After firing, men will return to the loading position, but will not open the breech in the deliberate practices until the last shot has been signalled. If it is necessary to suspend firing, all men who are in position will raise the safety-catch (or unload if no safety-catch is provided), until the order is given to resume the practice.

7. Important Rules.—(i) **Loading.**—*Loading will always be through the magazine.*

(ii) **Sling.**—*Dependence on the sling should be discouraged, and it will not be used for steadying the rifle in range practices.*

(iii) **Rifle.**—*No soldier equipped with a rifle is permitted to fire with any but his own.*

(iv) **Sighting Shots.**—*No sighting shots are allowed.*

(v) *Men will fire singly, never in twos or threes.*

8. Shots to verify Wind or Elevation.—Occasional shots to verify elevation or strength of wind, or to prove the accuracy of a rifle, may sometimes be fired by an officer or non-commissioned officer, with the senior officer's permission. They will not be fired during classification practices or standard tests. Notification of their commencement and conclusion will be made to the officer in the butts by telephone, signal, or bugle-sound. The target in use will be lowered and checked, and a clean one raised for the occasional shots. When they are completed, it will be lowered and checked, and the original target raised for the firer to complete his rounds.

9. Resting Arm or Rifle.—A coat or waterproof-sheet may be used to protect the uniform, but *except when firing from cover, or when rests are authorized, neither rifle, forearm,*

wrist, nor hand, is to rest against anything, or to be supported.

10. No one is allowed at the firing-point, except the men actually firing, the instructors, and officers. All non-commissioned officers and men not on duty at the firing-point will ground or pile arms, and remain not less than 30 yards in rear of the firing-point. No shouting is allowed; men next to fire will be brought up by signal.

11. Instruction during Intervals of Firing.—(i) During intervals of firing an opportunity should be given occasionally to all ranks for revising their impressions as to the visibility of the human figure at short distances, by placing men on the firing-platforms up the range. The study of visibility under conditions of known distance and in relation to targets used for practice in shooting is especially valuable.

(ii) Those men who are not actually engaged in firing should receive instruction in ground reconnaissance, use of the eyes, use of field-glasses, range-finding, and description of ground, while waiting behind the firing-point.

12. Field-Glasses.—Field-glasses or telescopes will be carried by all officers and section commanders. The men should be encouraged to use them during spare time on the range.

13. Condition of Sights.—The sights will be used as issued, without alteration of any kind. They may not be blackened; the browning is renewed by an armourer when required. No additions, marking, or colouring, are permitted, nor are orthoptics allowed.

14. Observation Practices.—The change which takes place in conditions of shooting when there is no signalling of each shot is not always appreciated, and it is essential that the importance of the first application of fire should be realized. Troops, therefore, which are unable to fire field practices should fire some at least of the instructional practices without signalling. Such practices are called

"observation practices." The targets should be placed on the face of the stop-butt or at the foot of the gallery-bank, and may with advantage be falling or collapsible targets.

15. Precautions.—To guard against accidents, the following orders will be observed:

(i) No firing will take place until a large red danger-flag is hoisted on the signal-staff at or near the butts, and the necessary look-out men posted.

(ii) A smaller red danger-flag will be hoisted at the butts as a warning to cease fire. This flag will remain exposed during the entire period of cessation of fire, and will not be withdrawn until the whole of the butt party is under cover. No one will leave the butts until cessation of fire has been notified from the firing-point.

(iii) A red flag will be kept raised at the firing-point when no firing is taking place, and will be lowered only on the order of the senior officer. This order will not be given until the flag at the butts has been withdrawn.

(iv) Aiming or snapping during target practice may only take place from the firing-point after the red flag has been lowered.

Section 59.—Surplus Ammunition and Computation of Averages.

1. Surplus Ammunition.—The rounds shown as "surplus" in Tables A and B will be distributed primarily by commanding officers for the following purposes:

(i) Repetition firing, as prescribed in the tables.

(ii) Fifteen rounds per man to be expended by company commanders for further training of indifferent shots.

(iii) The further training of recruits.
(iv) Fire-direction practices.
(v) The testing of rifles when necessary.
(vi) Occasional shots on the rifle-range (Sec. 58, para. 8).
(vii) Ten rounds per man who commences the course for voluntary practice.
(viii) Any surplus available after the above requirements have been fulfilled will be distributed to companies for general practice. It is not to be used for practice for competitions.

2. Computation of Averages.—The best shot of each squadron or company will be determined by his aggregate score in Part III. Averages made by companies in each of the classification practices will be calculated to one place of decimals, and published in regimental orders. Only the scores of those officers, non-commissioned officers, and men who completed a practice will be included in the numbers by which the total points made in that practice are divided. Points made by casuals (see footnote to Sec. 63) will be included at the end of the year, and fresh averages struck. The sum of the averages of the practices of Part III. will be termed the "company average" in classification practices.

Section 60.—Conditions of Qualification

1. The conditions for qualification in Part I., Table B, are:

A score of not less than 15 in each of Practices 1 and 4, and a total of not less than 45 in Practices 2, 3, 5, and 6.

2. Those who fail to reach any of these standards will, after firing Practices 7 to 14, repeat those practices of

Part I. in which they failed, until the standard is attained or a third failure is recorded. They will omit Practices 15, 16, and 17. Those who fail to reach all the standards after two repetitions of those practices in which they failed will be classified as Third-Class shots, and will not fire Part III., but will fire Part VI. if ammunition is available. Special reports will be submitted in the case of men who are found to be incapable of reaching the second class standard in Table B.

Section **61.**—Classification Practices and Conditions of Classification.

1. The classification practices should be fired during the most favourable time of year for individual firing. As a man's pay is affected by these practices, every facility should be given for firing to be carried out under favourable conditions.

2. With the exception of those who are exempted from musketry by the regulations, every man on the strength of his unit on the last of the four days allotted to classification firing will be classified at or before the end of the year.

3. Trained men, not exempted by the regulations, who for any reason do not commence Table B will be classified as Third-Class shots. Those who commence Table B, Part III., but do not complete it, will be classified according to the number of points obtained in those practices which they complete.

4. A note will be made in the Company and Battalion annual returns of the number of men (if any) who are classified without having completed the range practices of Table B.

5. Cavalry and Infantry.—(i) Cavalry and infantry soldiers, if qualified in Part I., will be classified upon their total scores in Part III. as follows:

Those who obtain 130 points and upwards	Marksmen.
Those who obtain 105 points and less than 130	First-Class shots.
Those who obtain 50 points in Practices 18 to 22 inclusive, or in the alternative obtain 70 in Part III.	Second-Class shots.
Those who for any reason fail to attain the Second-Class standard ..	Third-Class shots.

(ii) Commanding officers will take every opportunity of stimulating all ranks to take an interest in shooting and judging distance by granting indulgences to the most proficient, and by giving prominence to the best shooting company in any manner considered desirable.

(iii) Third-Class shots will not be employed in any capacity which will interfere with their attendance at all parades and instructional duties.

6. Royal Engineers.—The sappers and pioneers of the Royal Engineers (Regular Forces) will fire the following practices:

(i) *Table A.—Recruits' Course Regular Forces* (*Cavalry, R.E., Infantry*), *and Special Reserve* (*R.E., and Infantry*), *Parts I., II., III., and IV.* They will not repeat Part I., nor any practices of Part II., unless they fail to make a total score of 90 points in these practices. Those who fail to obtain 90 points will, after firing Part III., repeat Practices 5 to 12, instead of firing Part IV. Surplus ammunition will be used for the further training of indifferent shots, for testing rifles, or for occasional shots.

(ii) *Table B.—Annual Course, Regular Forces* (*Cavalry, R.E., and Infantry*). *Parts I., II.* (*Practices* 7, 9, 12, *and* 14), *and III.* The qualification standard will be the same as for the cavalry and infantry. Those who fail to qualify in Part I. at the first attempt will proceed with the

prescribed practices of Part II. (twenty rounds), and then repeat those practices of Part I. in which they failed. Those who fail twice in any of the standards in Part I. may, provided sufficient ammunition is available out of the authorized annual allowance, repeat those practices in which they failed once more, with a view to qualification. Those who repeat any practices of Part I. will, if they qualify on first or second repetition, fire the whole of Part III., or, failing that, Practices 19, 20, 23, 24, and 25, according to the amount of ammunition available.

(iii) Any man who qualifies in Part I. on the first, second, or third attempt, and completes the practices of Part III., will be classified according to the standards of Part III., but not below Second-Class shot. Those who complete Practices 19, 20, 23, 24, and 25 only will be classified as Second-Class shots, provided they have qualified in Part I.; those who fail in Part I., or who, having qualified in Part I. for any reason do not complete these five practices, will be classified as Third-Class shots. Any ammunition unexpended will form a surplus for further instruction.

7. R.A.M.C. and A.V.C.—Recruits of the R.A.M.C. and A.V.C. will fire Practices 1 to 4, Table B (Royal Artillery, etc.). The following standard will be required:

Practice 1.—All shots in a 12-inch ring. Those who fail to attain this standard will repeat Practice 1 until they do so, or expend the full allowance of ammunition. Ammunition not required for the above practices is to be expended on preliminary training on the 30-yards range, as considered necessary.

Section 62.—Recruits' Course, Regular Forces, Cavalry, R.E., and Infantry.

1. Part I.—Part I. should be fired intermittently during the latter part of preliminary training, and may be repeated as often as is considered necessary. The conditions may be varied, with the object of removing any particular defects observed in previous shooting.

2. Part II.—On the completion of Part II., recruits will repeat once those practices of Part II. in which they failed to reach the Grouping Standard, or, if they obtain less than 90 points in Part II., they will repeat, once, the whole of Part II. before proceeding to Parts III. to VI.

3. Elementary Field Practices.—Recruits who have completed their course of instruction in range practices will fire elementary field practices before joining their companies in the trained soldiers' course in order that they may realize the true function of elementary shooting as a means to an end and a preparation for field firing—not as an end in itself.

Section 63.—Execution of Tables A and B in the Same Year.

1. Soldiers of the cavalry, Royal Engineers, and infantry of the Regular Forces who complete Table A will be exercised in the whole of Table B (sappers of the Royal Engineers the prescribed practices only), with their own companies, if possible, in the same year; but their scores in Part III. will not be included in the company or battalion averages. In special cases, which should be exceptional, commanding officers may direct that backward men shall repeat Part II., Table A, instead of firing any portion of Table B in the same year.

2. If Part II., Table B, has been commenced before they are available, they will begin firing at any practice which their companies are executing at the time they become qualified, and will then complete the remainder of the table. If all the companies in the battalion have completed Part II., Table B, before they are available, the brigade commander will decide as to whether they shall be exercised as casuals.* They will be awarded marksmen's badges if they attain the necessary standard in Table B. In any case, they will receive such further practice in firing as may be considered by their company commanders to be necessary.

Section **64**.—Trained Soldiers' Course.

1. Object of Range Practices.—Range practices are fired by trained soldiers in order that they may revise their knowledge of elementary and timed shooting before entering upon more advanced practices. Soldiers who have missed the whole or a portion of the range practices and have become available to commence the field practices with their companies may, if they are known to be good shots, be allowed by their commanding officers to execute the field practices, and fire the range practices subsequently.

2. Programme of Instructional Practices.—Considerable latitude is allowed as regards the programme of instructional practices. Officers commanding companies may vary the number of rounds to be fired by individuals, or they may alter the order of the practices in Part II.

* All men not fully exercised in Table B with their companies (except those referred to in the first sentence of the paragraph to which this note refers) will be attached to other companies to carry out the range or field practices omitted; or, if all companies have completed Table B, a party of casuals may be formed to insure that all men qualified are fully exercised in the whole of Table B.

Officers commanding battalions may, with the approval of general officers commanding brigades, vary the instructional practices in any way calculated to further instruction; but it is not permitted to design practices, or to vary the details of practices in Part II. with the object of assimilating the conditions to those of the classification practices.

3. Uncompleted Practices.—If a man has fired one or more rounds in any range practice, and is prevented from completing it, the points made will not count, and the whole practice will be recommenced when his training is resumed. *Every soldier not exempted by Musketry Regulations or by the King's Regulations will execute the full course of range and field practices yearly.*

4. Correction of Sighting.—Correction of sighting in individual firing is rarely possible in war. It is therefore all-important to estimate the elevation and deflection for the first shot. When a reasonable standard of skill in trigger-pressing has been shown in grouping practices, and the principle of application is understood, further practice in deliberate fire should aim at successful application of fire from the first shot, and less importance should be attached to correction of sighting, according to the signalling, of a series of shots.

5. Sighting Shots.—For this reason skilled shots should fire two or three shots at each of several ranges for sighting practice rather than long series of shots at one or two distances. Only a few rounds in all should be devoted in their case to deliberate shooting; a high standard of snap-shooting should be developed. Officers and sergeants may fire sighting-shots at ranges beyond 600 yards, but as a rule such training should be reserved for the fire-direction practices.

6. Allowance for Wind.—It is convenient to memorize the effect of right-angle winds at some one distance, as a guide in estimating deflection allowance for winds of similar

strength at other distances. Five hundred yards is a satisfactory range for this purpose, and the approximate effect of right-angle winds blowing ten, twenty, and thirty miles per hour may be studied with advantage. *The use of elaborate wind-tables, and dependence on flags, telescopes, or sighting-shots, is prohibited.*

TABLE A.

RECRUITS' COURSE—REGULAR FORCES (CAVALRY, ROYAL ENGINEERS, AND INFANTRY).

N.B.—Royal Engineers (Sappers and Pioneers) of the Regular Forces will fire those practices only which are detailed in the Instructions for Royal Engineers (see Sec. 61, para. 6).

PART I.—INSTRUCTIONAL PRACTICES (ELEMENTARY).

No.	Practice.	Target.	Distance in Yards.	Rounds.	Instructions for Conduct of Practice.
1	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying, with arm or rifle rested.
2	Application	2nd Class Elementary (Bull's-eye)	200	5	Lying, with arm or rifle rested.
3	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying.
4	Application	2nd Class Elementary (Bull's-eye)	200	5	Lying.
		Total rounds ..		20	

PART II.—INSTRUCTIONAL PRACTICES (REPETITION).

5	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying. All shots in 12-inch ring.
6	Application	2nd Class Figure	200	5	Lying, with arm or rifle rested. Five hits, including four within inner (24-inch) ring.

PART II.—INSTRUCTIONAL PRACTICES (REPETITION)—*Continued.*

No.	Practice.	Target.	Distance in Yards.	Rounds.	Instructions for Conduct of Practice.
7	Application	2nd Class Figure	200	5	Lying. Five hits within Magpie (36-inch) ring.
8	,,	,, ,,	300	5	Lying. Five hits.
9	,,	1st Class Figure	200	5	Kneeling. Four hits at least within inner (40-inch) ring.
10	,,	,, ,,	300	5	Kneeling with arm or rifle rested. Four hits at least within inner (40-inch) ring.
11	,,	,, ,,	400	5	Lying. Four hits at least.
12	,,	,, ,,	500	5	Lying, with arm or rifle rested.
13	,,	,, ,,	500	5	Lying.
14	,,	,, ,,	600	5	Lying, with side of rifle only rested.
		Total rounds ..		50	

PART III.—INSTRUCTIONAL PRACTICES (TIMED).

15	Deliberate	2nd Class Figure	200	5	Lying.
16	,,	,, ,,	200	5	Kneeling
17	Rapid	,, ,,	200	5	Lying. 40 seconds allowed.
18	Deliberate	1st Class Figure	400	5	Lying.
19	Rapid	,, ,,	400	5	Lying. 40 seconds allowed.
20	Deliberate	,, ,,	500	5	Lying. Taking cover behind stones or sandbags representing a parapet and firing over them.
21	Snapshooting	2nd Class Figure	200	5	Lying. Exposure, 6 seconds for each shot.
22	Snapshooting	,, ,,	200	5	Kneeling. Taking cover in a trench, or behind a screen representing a wall, and firing over the parapet. Exposure, 6 seconds for each shot.
		Total rounds ..		40	

Part IV.—Instructional Practices.

No.	Practice.	Target.	Distance in Yards.	Rounds.	Instructions for Conduct of Practice.
23	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying.
24	Application	1st Class Figure	300	5	Kneeling.
25	Rapid	,, ,,	300	5	Lying. 40 seconds allowed.
26	Snapshooting	2nd Class Figure	200	5	Lying. Taking cover as in 20. Exposure, 5 seconds for each shot.
27	Application	1st Class Figure	500	5	Lying.
		Total rounds ..		25	

Part V.—Individual Field Practices.

Twenty rounds will be expended in elementary practices, 10 rounds in an attack practice from 700 to 200 yards, and 10 rounds in a defence practice against full-length figures representing an advancing enemy.

Total rounds 20

For the Conditions of Individual Field Practices on Classification Ranges, see pp. 185–188.

Part VI.—Collective Field Practices.

Twenty-five rounds will be expended, if ammunition is available.

Total rounds 25
Surplus rounds 20
Total rounds for Table A .. 200

For the Conditions of Collective Field Practices on Classification Ranges, see pp. 188–192.

TABLE B.

ANNUAL COURSE—REGULAR FORCES (CAVALRY, ROYAL ENGINEERS, AND INFANTRY).

N.B.—The Royal Engineers (Sappers, Regular Forces), including Regular Establishment of the R.E. Special Reserve, will fire those practices only which are detailed in the Instructions for Royal Engineers (see Sec. 61, para. 6).

Trained drivers of the Royal Engineers will fire:

Part I.—Practices 1, 2, 3, 5, and 6.
Part II.—Practices 7 and 9.
Part III.—Practice 19.

They will be classified on the same standard as laid down for the forty rounds fired in Table B, p. 169.

PART I.—QUALIFYING PRACTICES.

No.	Practice.	Target.	Distance in Yards.	Rounds.	Instructions for Conduct of Practice.
1	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying, with arm or rifle rested.
2	Application	,, ,,	200	5	As in 1.
3	,,	2nd Class Figure	300	5	Kneeling, with arm or rifle rested.
4	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying.
5	Application	1st Class Figure	400	5	Lying.
6	,,	,, ,,	500	5	Lying, with side of rifle only rested.
		Total rounds ..		30	

PART II.—INSTRUCTIONAL PRACTICES (TIMED).

7	Snapshooting	2nd Class Figure	200	5	Lying. Taking cover behind stones or sandbags representing a parapet and firing over them. Exposure, 6 seconds for each shot.
8	,,	,, ,,	200	5	Sitting or kneeling. Bayonet fixed. Exposure, 6 seconds for each shot.

PART II.—INSTRUCTIONAL PRACTICES (TIMED)—*Continued.*

No.	Practice.	Target.	Distance in Yards.	Rounds.	Instructions for Conduct of Practice.
9	Rapid	2nd Class Figure.	200	5	Lying. Bayonets fixed. 30 seconds allowed.
10	Deliberate	,, ,,	300	5	Lying.
11	Rapid	,, ,,	300	10	Lying. Rifle unloaded and magazine empty until the target appears. Loading from the pouch or bandolier by 5 rounds afterwards. One minute allowed.
12	Deliberate	1st Class Figure	500	5	Lying.
13	Rapid	,, ,,	500	5	Lying. Taking cover as in 7. 45 seconds allowed.
14	Deliberate	,, ,,	600	5	Lying. Taking cover behind stones or sandbags and firing round them, with side of rifle only rested.
15	Snapshooting	Figure No. 3 (silhouette)	200	5	Lying. Taking cover as in 14. Exposure, 4 seconds for each shot.
16	,,	,, ,,	200	5	Kneeling. Taking cover in a trench or behind a screen representing a wall and firing over the parapet. Exposure, 5 seconds for each shot.
17	Crossing shot	Figure No. 6 (silhouette)	200	5	Lying. One shot at each run of 30 feet. Pace of target—quick time.
		Total rounds ..		60	

PART III.—CLASSIFICATION PRACTICES.

18	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying.
19	Snapshooting	Figure No. 3 (silhouette)	200	5	Lying. Taking cover as in 7. Bayonet fixed. Exposure, 4 seconds for each shot.
20	Deliberate	2nd Class Figure	400	5	Lying. Taking cover as in 14.

Part III.—Classification Practices—*Continued.*

No.	Practice.	Target.	Distance in Yards.	Rounds.	Instructions for Conduct of Practice.
21	Deliberate	2nd Class Figure	300	5	Kneeling. Taking cover as in 16.
22	Rapid	,, ,,	300	15	Lying. Rifle to be loaded and 4 rounds in the magazine before the target appears. Loading from the pouch or bandolier by 5 rounds afterwards. One minute allowed.
23	Deliberate	1st Class Figure	500	5	Lying.
24	Rapid	,, ,,	500	5	Lying. 30 seconds allowed.
25	Deliberate	,, ,,	600	5	Lying. Taking cover as in 7.
		Total rounds ..		50	

Note.—No instruction or assistance of any kind will be given to any man during the firing of Part III., Table B (Cavalry, R.E., and Infantry).

The use of the wind-gauge or of the fine adjustment will not be permitted in any classification practice or standard test classification practice.

Part IV.—Individual Field Practices.

Total rounds 35

For the conditions of Individual Field Practices on Classification Ranges see pp. 185-188.

Part V.—Fire Direction Practices.

Short series of shots will be fired at distances beyond 600 yards by officers and non-commissioned officers for practice in observation of fire, estimating atmospheric influences, and verifying sighting by trial shots. Screens, or any visible objects such as might serve as range marks on service, will be used as targets. About 300 rounds, drawn from the surplus, should suffice. Special fire-direction exercises should be substituted for these practices if range accommodation does not extend beyond 600 yards.

Part VI.—Collective Field Practices.

Total rounds 50
Surplus rounds 25
Total rounds for Table B .. 250

For the conditions of Collective Field Practices on Classification Ranges see pp. 188-192.

TABLE A.

RECRUITS' COURSE—ROYAL ARTILLERY, DRIVERS ROYAL ENGINEERS (REGULARS), ARMY SERVICE CORPS (REGULARS AND SPECIAL RESERVE), AND ARMY ORDNANCE CORPS.

Grouping Practice for those Recruits or Trained Men who fail in the Preliminary Test.

No.	Practice.	Target.	Distance in yards.	Rounds.	Position and Grouping Standard.
1	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying, with rest.
2	,,	2nd Class Elementary (Bull's-eye)	100	5	Lying
		Total rounds ..		10	

Elementary Course for First-Year Men and Third-Class Shots.

1	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying. All shots in 12-inch ring.
2	Application	2nd Class Elementary (Bull's-eye)	200	5	Lying, with rest. Five hits including four within Inner (24-inch) ring.
3	,,	2nd Class Elementary (Bull's-eye)	200	5	Lying. Five hits, including four within Inner (24-inch) ring.
4	,,	1st Class Figure	300	5	Lying. Taking cover behind stones or sandbags representing a parapet and firing over them. Four hits.
5	,,	,, ,,	400	5	Lying.
6	,,	,, ,,	500	5	Lying. Taking cover as in 4.
		Total rounds ..		30	

Note.—The course should be fired in five days as follows:—
Practices 1 and 2, *first day*. Repetition, *second day*. Practices 3 and 4, *third day*. Repetition, *fourth day*. Practices 5 and 6, *fifth day*.

Practices 1, 2, 3, and 4 will be repeated once each if the grouping standard is not attained, but not on the same day. Should the firer have attained the grouping standard in any of the first four practices without repetition, he may on conclusion of all the practices be given the option of repeating No. 6 with a view to increasing his score for qualification.

In all cases of repetition the second score only will count for classification.

As a rule five days should be devoted to firing the course, of which the second and fourth would be reserved for repetition and careful instruction of indifferent shots.

Surplus rounds will be used as the officer commanding the battery or company may direct on preliminary or further training, testing rifles, occasional shots, or marksmen's firing in Part III., Table B, for cavalry and infantry.

Points required for 2nd Class=65. Grouping standards have no effect on classification; they govern repetition only.

TABLE B.

ANNUAL COURSE—ROYAL ARTILLERY, ARMY SERVICE CORPS, AND ARMY ORDNANCE CORPS.

Trained Soldiers' Course for Marksmen, First and Second Class Shots.

No.	Practice.	Target.	Distance in Yards.	Rounds.	Position.
1	Grouping	2nd Class Elementary (Bull's-eye)	100	5	Lying.
2	Application	2nd Class Figure	200	5	Lying. Taking cover behind stones or sandbags and firing round them with side of rifle only rested.
3	,,	2nd Class Figure	300	5	Sitting or kneeling.
4	,,	1st Class Figure	400	5	Lying.
5	Rapid	,, ,,	400	5	Lying. 40 seconds allowed.
6	Application	,, ,,	500	5	Lying. Taking cover behind stones or sandbags representing a parapet and firing over them.
7	Snapshooting	2nd Class Figure	200	5	Lying. Taking cover as in 2. 5 seconds' exposure.
8	Observation	Iron falling	300	5	Lying. Taking cover as in 6. Firing in pairs.
		Total rounds ..		40	

NOTE.—Three points will be allowed for every direct hit in Practice 8.
In Practices 5 and 8 there will be no signalling until the firer has completed his practice.
In Practice 8 there will be separate targets for each firer, and the firers in each pair will fire alternately, assisting each other by observation.
Classification:—

Those who obtain 95 points or more	1st Class shots.
Those who obtain 60 points and less than 95	2nd Class shots.
Those who obtain less than 60 points	3rd Class shots.

Section 65.—General Rules for Field Practices.

1. Special Instructions.—(i) (*a*) Not more than twenty rounds should be fired in field practices in one day.

(*b*) The dress for individual field practices will be drill order, and for collective field practices marching order.

(*c*) The firing positions will be any that are suited to the ground or conditions of the scheme.

(*d*) Some practice should be given in snapshooting in the standing position during rapid advances at short range.

(ii) **Practices on Classification Ranges.**— If it is absolutely necessary to use classification ranges (see Sec. 66), the practices should be performed on a flank, if the extent of the danger area will permit. In this case, or if the actual range is used, the ground should be broken by means of screens, earth parapets, brushwood, or any other suitable contrivance, with a view to introducing some realism and uncertainty as to distances.

(iii) **Allotment of Ammunition.**—The allotments of ammunition to individual and collective field practices respectively may be varied as general officers commanding may decide, but the total amount allotted to field practices is to be fired in field practices, even if a classification range only is available. Due safety precautions must be taken (see *Musketry Regulations*, Part II.).

(iv) **Registers and Records.** — Company commanders will keep registers of all collective practices fired. Ricochets will not be included in the figures recording results of

standard or comparative firing. They will be shown separately from other hits in the registers.

2. Individual Field Practices.—(i) The distances should not exceed 600 yards. Training should be progressive in regard to targets, distances, and all other respects. *It is essential to give firers full information as to the object of the practice, and to criticize freely the good and bad points of their shooting* [Sec. 54, para. 2 (iv)].

(ii) The firers should be formed into small squads, but there should be no fire control, nor any orders except such as may be necessary to regulate fire and movement in the interest of safety and to insure that the objects of the training are fully carried out.

(iii) Practice will be afforded in acting promptly against targets appearing suddenly and disappearing after a short period of exposure. The value of every shot will be ascertained by markers, and notified to the firer. The men will as a rule fire alternately, working in pairs for mutual assistance. When a successful shot is observed, the correct sighting as found will be immediately notified by the firer to the remainder of the squad.

(iv) Any preliminary information as to the ground and results of range-finding at long range which might be available on service should be given in the later practices in order to combine all methods of ranging.

3. Collective Field Practices.—(*a*) Collective field practices, if ground is available, should be fired almost entirely at longer ranges. When ground is not available for firing at ranges beyond 600 yards, practice in collective firing is necessarily conducted at shorter ranges, but such practice must be supplemented by fire-direction practices without ammunition at longer ranges.

(*b*) *Arranging Targets.*—The practice of requiring units to arrange targets or positions for others to fire at, or during a skirmish to place head-and-shoulder targets on the

ground to represent themselves in position at any temporary halt, has been found to stimulate interest.

Casualty Competitions.—Falling or collapsible targets are of great value in all field practices, and may be used with advantage in casualty competitions designed to test the relative abilities of two firing lines, which simultaneously fire at separate sets of targets representing their opponents. Each man is represented by a target placed in front of the opposing firing-line, and becomes a casualty if that target falls. In this way superiority of fire is soon established by one line or the other, and fire ceases.

Section 66.—Field Practices on Classification Ranges.

1. General Rules.—The following are examples of individual and collective field practices for use on classification ranges, as used at the School of Musketry, Hythe. They are intended as a guide to officers who have to frame practices for their units. These practices and similar ones may be fired on classification ranges on which rapid practices are allowed if the following points are observed:

(i) **Damage to Gallery.**—It is most important, for the safety of the range, that any damage done to the gallery-bank should be made good each day, as soon as the practices are completed.

(ii) **Oblique Fire.**—In practices involving oblique fire, such as those in which the crossing figure No. 6 is used, the run of the figure or figures should be confined to a lateral space of 25 yards. The firers should occupy a corresponding space at the firing-point. These oblique practices must not be fired at ranges less than 400 yards.

(iii) **Falling Plates.**—Earthenware tiles should be used, as steel plates give back-splashes which may en-

danger the markers. *Tiles* should be placed about 4 feet below the top of the stop-butt. If there is no stop-butt, they may be placed at the foot of the gallery-slope.

2. Targets.—Targets will be supplied by R.E. (*vide Musketry Regulations*, Part II., 1910, para. 141).

(i) **Wood.**—Veneer figures can be supplied, or they can be cut out of match-boarding. Dimensions will be found in *Musketry Regulations*, Part II., 1910, Plate 37 *et seq*. For use in a gallery, the figures must be mounted on poles.

(ii) **Tiles.**—Earthenware tiles can be obtained. Ordinary roofing tiles are cheaper, and answer the purpose. A useful and cheap substitute is 3 bricks placed on end on a flat piece of wood, and tied together with a piece of string or wire.

3. Markers.—The success of a practice depends largely on the markers. They should be rehearsed carefully, but not in view of the firers.

Individual Field Practices.

No. 1.

Object: To teach the necessity for quick opening of fire with effect from the first shot.

Rounds: 5 per man.

Targets: 2 iron falling-plates for each pair of firers.

Distance: Unknown—about 250 yards.

Method: 2 squads, each of four firers, are extended in pairs, rifles unloaded and at safe, sights normal, till the command "Fire." Squads fire against each other.

Targets represent the firers of the opposing squad.

When a target is knocked down, the man of the opposing team in a corresponding position ceases fire, unloads, and takes no further part in the practice; his ammunition is available for the other man of his pair.

Points are allotted as follows:
For each hit, 5 points; total, 10 points.
If both targets hit within 40 seconds, 5 points; total, 15 points.

No. 2.

Object: To bring out the dependence of movement on fire.
Rounds: 10 per man.
Targets: A Figure 3 target for each firer, to be exposed 3 times for 35 seconds at 35 seconds' interval. Targets to be twirled and lowered when hit, and not to reappear till the next exposure.
Distance: Known—600 to 400 yards.
Method: (6) Firers, with rifles loaded and extended behind cover on the 600 yards' firing-point; they open fire on the targets appearing. On the completion of each of the first two exposures the order "Advance" is given, when the firers double forward 100 yards.
Scoring: 3 points for each hit. 1 point for each unfired round handed in, if target has been hit at each range.

No. 3.

Object: To test men's intelligence and marksmanship.
Rounds: 10 per man.
Targets: 3 Figure 6 targets concealed behind a short length of wall (built of sandbags on the marker's gallery), or represented by a specially prepared screen, which is understood to be bullet-proof. One of the targets (representing a man observing) looks round one end of the wall for 10 seconds, and if not fired at moves in quick time along the gallery, followed by the other two targets at 3 paces interval.

On the first shot being fired, all targets move at the double towards the nearest cover (either the wall or the end of the gallery). Any targets which are still under cover when fire is opened do not appear.

Targets to be twirled and lowered when hit.
Distance: Known—400 yards.
Method: 2 men with rifles loaded are concealed behind cover on the 400 yards' firing-point, and are told the following:

"You are a patrol; before reaching this point you saw an enemy's patrol of 3 men move behind the wall on the marker's gallery; you have crept up here unseen by them.

" None of your troops are within a mile of you, and it is unlikely that the enemy's patrol is closely supported.

" Your object is to try to shoot all the enemy's patrol. The marker's gallery represents flat ground, with cover at each end of it."

No. 4.

Object : A test of rapidity of fire, combined with accuracy after movement.

Rounds : 10 per man.

Targets : A Figure 3 target and 5 iron falling-plates for each firer.

The Figure 3 target to be exposed twice for 3 seconds at an interval of 30 seconds.

Distance : 200 to 300 yards.

Method : (6) Firers are formed up about 50 yards in rear of the selected fire position (rifles unloaded and at safe).

On the command, " Advance," they rush to the fire position, load, and adjust sights. 25 seconds after the order " Advance," the Figure 3 target is exposed, when fire will be opened. The falling-plates will then be engaged till the second exposure of the Figure 3 target, after which fire will cease.

Scoring : 2 points for each hit on the Figure 3. 1 point for each plate knocked down.

(If desired, this practice can be carried out without movement.)

No. 5.

Object : To teach the necessity for quickness in obtaining effect.

Rounds : 5 per man.

Targets : 1 Figure 6 target, 1 Figure 3 target, and 2 Figure 4 targets for each firer, to appear as follows within a given sector at about 5 seconds' interval:

Figure 6 moving to a flank for 5 seconds.
Figure 3 appears for 4 seconds.
Figure 4 appears for 3 seconds.
2 Figures 4 appear for 10 seconds.
Targets when hit will not be replaced.

Distance : Known—300 yards.

Method : (6) Firers with rifles loaded are extended behind cover, and told to watch their front. They open fire on the appearance of the targets.

Scoring: Figure 6 target—3 points.
„ 3 „ 2 „
„ 4 „ 1 point.

No. 6.

Object: A test of rapidity and accuracy of fire.
Rounds: 10 per man.
Targets: A Figure 4 target for each firer, exposed for 45 seconds, divided into 3 unequal exposures, at intervals of 5 seconds. Targets to appear in a different place at each exposure (within certain limits).
Distance: Known—200 yards.
Method: (6) Firers lying in the open (rifle unloaded and at safe) are told to watch their front. On the appearance of the targets, they load and open fire.

Collective Field Practices.

No. 1.

Object: To practise section commanders in applying collective fire from observation.
Rounds: 10 per man.
Targets: 8 iron falling-plates 1 yard apart, in two groups of four, on the stop-butt.
Distance: Unknown—about 850 yards.
Method: A section (12 firers) is formed up in rear of the 800 yards' firing-point. Rifles to be unloaded and at safe till warning, "Commence," 3 minutes after which fire will cease.
Notes.—Method of ranging and correction. Point of aim given. Fire orders.

No. 2.

Object: To exercise section commanders in giving fire orders and in controlling fire.
Rounds: 10 per man.
Targets: (*a*) 3 Figure 3 targets, 1 yard apart.
(*b*) 1 Figure 6 target.
(*a*) and (*b*) are exposed twice separately and once together in any order for 30 seconds at irregular intervals.
Targets hit will be twirled and lowered, and will not reappear till the next exposure.

Distance : Known—500 yards.

Method : A section (12 firers) is extended on the firing-point; on the appearance of the targets, the commander gives his fire orders.

NOTES.—Rapidity in dealing with the situation. Fire orders. Volume employed. Point of aim.

No. 3.

Object : To bring out the necessity for (*a*) opening fire in full volume to produce surprise, (*b*) making fire effective from the first opening.

Rounds : 10 per man.

Targets : 8 Figure 1 targets, representing men in close formation. On the first shot being fired, these are replaced by 8 Figure 6 targets extending outwards; when these are well extended, they are replaced by 8 Figure 4 targets, which remain exposed for 1 minute. Any figure hit will be lowered, and not replaced by another.

Distance : Known—500 yards.

Method : A section (12 firers) is ordered to ambush and shoot all of a small body of the enemy in order to obtain some written information which is believed to be in their possession. The enemy is expected to cross a piece of flat ground represented by the marker's gallery.

NOTES.—Use of cover for concealment. Preliminary arrangements. Simultaneous and quick opening of fire in full volume at the close formation. Change of rate to slow fire at the extended line.

No. 4.

Object : Superiority of fire. A test of rapidity and accuracy of fire.

Rounds : 10 per man.

Targets : 10 Figure 3 targets, reinforced by 3 more after 15 seconds, and then every 10 seconds up to 55 seconds.

Targets hit are lowered.

If at any time all targets have been hit, no more will be put up; benefit of doubt to be given to the firers.

Should the number of targets at any time exceed 10, the firers have lost superiority of fire, and fire ceases.

Distance : 400 yards.

Method: A section (10 firers), with rifles unloaded and at safe, lie down on the firing-point. Sights may be adjusted.

On the appearance of the targets, the commander gives orders to load, and fire orders. Fire will cease (*a*) should the number of targets exceed 10, (*b*) if all targets are down, (*c*) one minute after the first appearance of the targets.

The time in which all targets are hit, or the number of targets left standing at the end of a minute, should be noted.

NOTE.—This practice may be fired as a competition.

No. 5.

Object: A practice which brings out rapidity of loading, sight-setting, movement, and fire, combined with accuracy.

Rounds: 10 per man.

Targets: 10 iron falling-plates extended to 3 paces.

Distance: 600 yards to position.

Method: A section (10 firers) lie down on the firing-point, rifles unloaded and at safe, sights normal, till the warning, "Commence," when the commander gives his orders.

One round at least must be fired by each man before an advance of 100 yards is allowed. The whole section must advance together.

NOTE.—Should this practice be fired as a competition, the section which knocks down all its plates in the shortest time, or that which knocks down most plates, wins.

It will generally be found that the section which reaches 300 yards quickest will win. Teams to be disqualified if anyone advances till all safety-catches are on.

No. 6.

Object: To bring out the great advantage of ranging by observation, before the target appears, when circumstances permit.

Rounds: 15 per man.

Targets: 20 Figure 6 targets. A length of wooden hurdles on the marker's gallery represents a bridge.

Distance: 800 yards.

Method: A section (10 firers). The commander is given the following information:

"You are placed here to cover that bridge, which is the only way the enemy can cross.

" They are now 500 or 600 yards from it, and mean to get across.

" You are being supported, and your first duty is to be prepared to bring a heavy fire on the bridge.

" There is no need for concealment."

NOTE.—The enemy appears near the bridge 3 minutes after these instructions are given. Method of ranging. Anticipatory orders.

No. 7.

Object: A practice to exemplify fire and movement during an advance.

Rounds: 15 per man.

Targets: A screen 10 by 3 feet at 800 and 700 yards. Both will be put up together; one will be lowered when hit by 10 shots at 800 yards, the other will similarly be lowered when hit 10 times at 700 yards.

5 Figure 3 targets extended to 3 paces will be exposed 5 seconds after the disappearance of the second screen.

Targets to be exposed till hit; they will be lowered when hit.

5 seconds after the last target is hit they will be again exposed till they have been exposed 5 times.

Distance: Known—800 to 200 yards.

Method: 2 sections (20 firers) under the platoon sergeant, lie down on the 800 yards' firing-point, rifles unloaded and at safe, sights normal. On the warning, " Commence," the commander gives his orders, 10 minutes after which fire will cease.

A screen must be lowered before any advance may be made at 800 and 700 yards.

All five targets must be lowered before an advance may be made at the other ranges.

Advances will each be 100 yards.

No advance will be made beyond 200 yards.

NOTE.—If fired as a competition, the 2 sections who get most targets down win; if more than one team get all their targets down, that with the most ammunition in hand wins.

No. 8.

Object: A practice to show the dependence of movement on fire.

Rounds: 10 per man.

Targets: 12 Figure 3 targets, extended to 3 paces; each to be lowered when hit.

5 seconds after the last one has been lowered, the targets will be again exposed till hit.

Distance : Known—600, 500, 400 yards.

Method : A section (10 firers) is extended to 3 paces on the 600 yards' firing-point, rifles unloaded and at safe, sights normal.

On the warning, "Commence," the commander gives his orders.

No advance will be made from 600 yards till four targets have been lowered.

No advance will be made from 500 yards till the remaining eight targets have been lowered.

NOTE.—If fired as a competition, the section which hits all its targets at 400 yards in the shortest time wins, or the section which hits most targets.

CHAPTER IX

NIGHT FIRING, HAND GRENADES, AND COMPETITIONS

Section **67**.—Night Firing.*

1. Methods of Night Firing.—A body of troops in a position commanding open ground or an approach which may be used by the enemy may arrange to sweep it with fire by laying rifles in rests constructed by daylight, by preparing illuminated aiming-marks giving a horizontal line of sight, or by firing at the flashes of the enemy's rifles, or other marks by automatic alignment of the rifle. These various methods are explained in the following paragraphs. *Firing at night should only be employed within close range.*

2. Automatic Alarms and Flare Lights.—(i) Automatic alarms and flare lights to illuminate the foreground are useful against night attacks. They should be used in combination with obstacles, if any have been constructed, and either protected or concealed, so as to prevent the enemy removing them. *No mechanical signal must be relied upon as a substitute for the efficient use of the eyesight and hearing.*

3. Fixed Rifle-Rests and Aiming-Marks.—On a dark night it is difficult to insure the men's rifles being aimed in the required direction. Any device to assist them in

* For various arrangements to facilitate night firing, and their combination with automatic alarms, flare lights, and obstacles to increase fire effect and check the enemy, see Chapter VIII., *Field Entrenchments*, of this series (see also Preface, para. 7)

this matter is useful. Fixed rifle-rests may be made, or, failing these, some such device as a wooden bar can be arranged across loopholes, to prevent a man raising his rifle-barrel too high. Posts painted white on the defenders' side make a good aiming-mark, if the night is not too dark.

4. Automatic Alignment of the Rifle.—(i) The automatic alignment of the rifle is as a general rule the most effective method of firing at night. Men should therefore be practised in aligning their rifles automatically for night firing at ranges of about 300 yards and under.

(ii) **Method of Instruction.**—Aiming-marks should be selected just above the ground-line, and within 100 yards of the squad. The men should then be ordered to bring their rifles into the firing position with both eyes shut. The right eye should then be opened, and the approximate alignment of the rifle verified. After some practice each man will be able to ascertain his individual tendency, which he should correct with practice until able to align the rifle with his eyes shut with approximate accuracy.

(iii) This exercise should be carried out in the daytime until proficiency is attained, when men should be practised in firing a few rounds after dark at large screens at a range not exceeding 300 yards. The position of the screen may be indicated by some rough expedient to represent the flash of a rifle. Much material effect is not to be anticipated from night firing except against an enemy in movement, but the moral effect should be considerable.

5. Instruction on Miniature Ranges.—Directions for night firing on miniature ranges are contained in Sec. 74, para. 7.

Section 68.—Hand Grenade (Mark I).

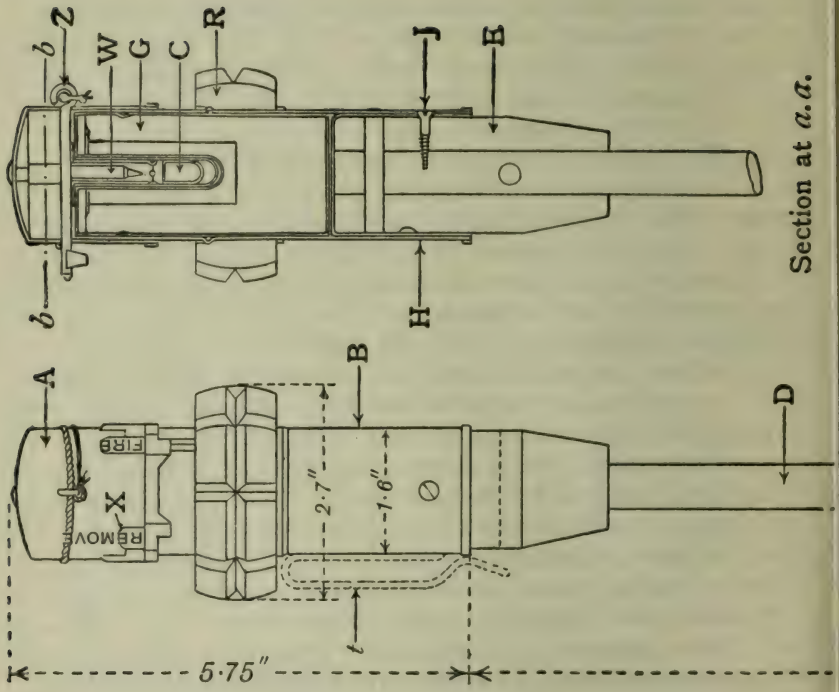
1. General Description (see Fig. 52).—The grenade consists of the following principal parts: Cap A, body B,

detonator C, cane handle D, wood block E, tail F, charge G, and cast-iron ring R.

2. The body B of the grenade carries the lyddite charge G. The wood block E is put into the recess in the cup H, and the cup, wood block, and body are then firmly secured together by means of the three brass screws J. Attached to the wood block E is the cane handle D, to the end of which is securely bound the tail F, the cane handle D being for the purpose of throwing the grenade, and the tail F to steady it in flight and to assist to make it travel and fall point foremost.

3. The upper part of the body has a groove M formed in it for the purpose of securing the cap A in position. The groove M is provided with four leads into it, two N.N., to allow of the insertion and removal of the cap, and two O.O., to allow the cap to move forward upon the grenade striking the ground or other obstacle. Two projections, e.e., are made in the groove M for the indent X in the cap A to jump when the cap enters or leaves the travel position. One projection is to be made long enough to carry the indent into the *Fire* position. The object of these two projections is to give a definite indication of when the cap is in the *Travel* and *Fire* positions. Two indicating knobs P.P. are secured to the body, and two stop pins Q.Q. are fixed below the indicating knobs P.P., preventing the cap A being pushed down too far (except when turned into the *Fire* position—(see later) if by any accident the safety-pin had been removed or displaced. Fixed to the top of the body are two holding studs R.R. to secure the detonator C when in position. The body has also painted on it in red two arrows L.L. for the purpose of indicating positions of cap A as to the removing, travel, or firing positions.

4. The detonator C is formed with a flange S on which are two lugs T.T. for the purpose of turning the detonator when in position, so as to secure it under the heads of the


Z
b
W
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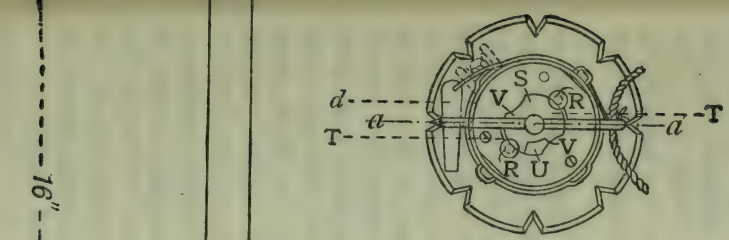
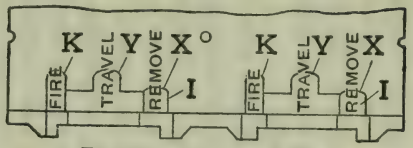
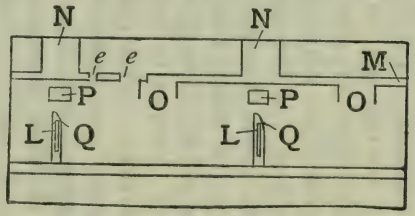


Section at *b.b.*
Grenade set in "Fire" Position.



Development of Cap



Development of Groove on Body.

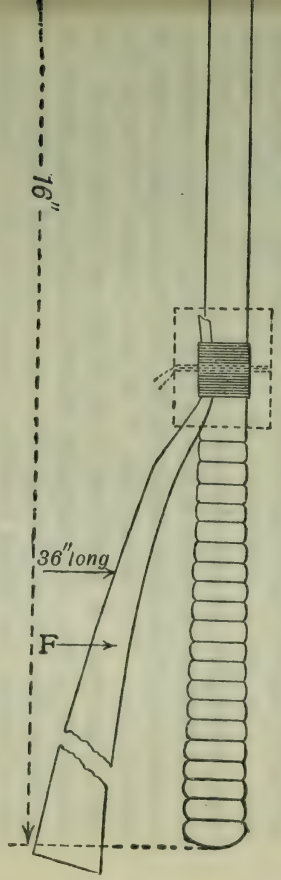


Fig. 52.—HAND GRENADE (MARK I). Scale $\frac{1}{3}$

holding studs R.R. On the face of the flange S is fixed a brass plate spring U, for locking the detonator into position. The two grooves V.V. in the flange S of the detonator C are to allow the flange S to pass the holding studs R.R. during insertion or removal of the detonator.

5. The cap A carries a steel needle W for firing the detonator. Two small indents X.X. are formed on the cap to engage with the groove M on the body B. The raised lips I.I. are to allow the cap A to clear the indicating knobs P.P. when the cap is being placed or removed from the body of the grenade.

6. Two raised lips K.K. are to allow the cap A to move forward when the cap is turned into its firing position, the lips K.K. being raised sufficiently to clear the stop pins Q.Q., this only being possible when the cap is in the firing position. The raised portions Y.Y. are for the indicating knobs to engage with when the cap is turned to the travel position, and thus give a further indication when the cap A is in this position. The cap is also fitted with a safety-pin Z, which passes through the needle and the cap, and prevents the cap moving forward while the pin is in position. The pin Z is secured by a whipcord becket passed over the cap A, and is also further secured by a thin leather strip d passing through a slot at one end, it being necessary to remove both these safeguards before the pin Z can be withdrawn. The safety-pin Z is also passed through the cap A in such a position that if by any mischance the detonator C was not properly secured after being placed in position, the act of placing the cap A on and turning it to the left into the firing position causes the pin Z to engage with the two lugs T.T. on the flange S of the detonator, and automatically locks the detonator under the heads of the holding studs R.R.

7. The hook *t* fixed to the body of the grenade is for attaching the latter to the soldier's belt. The grenade

with the stick downward is hung on to the belt by the hook.

8. To Prepare the Grenade for Use.—(i) Turn the cap A on to the body B to the right until the indicating knobs P.P. are in the raised lips I.I. formed in the cap A. This can be seen by means of the arrows L.L. painted on the body B being opposite the words "remove" on the cap A. Then pull off the cap.

(ii) Place the detonator C in the recess for it. See that the two grooves V.V. in the flange S coincide with the two studs R.R., then press down the detonator into position. When the flange S is home, turn the detonator C to the left, passing the flange under the heads of the studs R.R., and continue turning until the brass plate spring U is released, thus locking the detonator.

(iii) Replace the cap A with the raised lips I.I. over the indicating knobs P.P., and push down into position. After the cap A has been put on, it must be turned one-eighth of a turn to the left, thus bringing the indicating knobs P.P. into the raised positions Y.Y. of the cap A. This is done by pointing the indicating arrows L.L. to "travel" on the cap.

(iv) The grenade is intended to be carried with the raised portions Y.Y. always over the indicating arrows L.L.—*i.e.*, in the travel position, whether the detonator C is in position or not.

(v) **To Throw the Grenade.**—The tail is unwound, and allowed to hang loose at full length.

(vi) The cap is turned from the "travel" to the "fire" position.

(vii) The safety-pin is withdrawn.

(viii) The grenade is thrown by means of the cane D. The latter is grasped between the end furthest from the grenade itself and the attached point of the tail—*i.e.*, on the grooved portion. The grenade is thrown in the required direction

either under or over hand, care being taken that the tail cannot entangle itself with the thrower or with any object near him.

(ix) When throwing, the following points should be remembered:

(*a*) The grenade should be thrown well upwards at not less than an angle of about 35 degrees. This, besides assisting in increasing the range to which the grenade can be thrown, renders its action more absolutely certain by causing it to strike the ground nearly vertically. This is especially important when throwing with a following wind.

(*b*) Any obstacle lying between the thrower and the objective must be cleared, as the grenade will almost certainly act on anything it strikes during any part of its flight.

(x) **Caution.**—(i) Should the hand grenade not be used, the cap is to be turned back to "travel" from "fire," the safety-pin (which must be retained) is to be replaced in position, care being taken that the pin passes through the cap, and is secured by passing the whipcord becket over the cap, and by replacing the leather strip *d* through the slot in the end of the safety-pin Z, and the tail rolled up and secured.

(ii) Immediately the grenade has left the hand, the thrower should lie down or get behind cover to reduce the chances of being hit by a splinter, as, of course, the explosion sends these in all directions. Dummy grenades are supplied for practice in throwing.

9. Use of Grenades.—In addition to the hand grenade, grenades may be improvised by filling tins with explosive for throwing by hand. Grenades are also constructed so that they can be fired from rifles. Grenades can be used with effect against sap-heads in siege warfare and in trench fighting at close range.

Section 69.—Competitions.

1. Object of Competitions.—The principles governing competitions are laid down in para. 102, *Musketry Regulations*. The object of competitions is to encourage proficiency in service shooting under practical conditions. This object must not be confined to a few champion shots, but must include every man in each fire-unit. *A good average standard of marksmanship, especially in shooting at service targets at unknown ranges, is the ideal to be aimed at.* Team competitions in which fire-unit commanders are exercised in their duties, and in which they work together with their units, are the most practical and valuable form of competition. The various instructional practices, together with individual and collective field practices in Chapters VIII and X of this book, are suitable for competitions.

2. General Rules. — (i) The conditions of each competition must be suited to the rank and skill of competitors, and practise them in the duties they will perform in the firing-line.

(ii) **Programmes.**—Programmes should as far as possible embrace all elements of musketry training. Rules for the conduct of competitions should be the same as those for the conduct of range and field practices.

(iii) **Individual Firing.**—Individual firing competitions beyond 600 yards have little military value.

(iv) **Targets.**—Bull's-eye targets should as a rule be used in elementary competitions only for young soldiers in the first year of service. Service targets should be used of neutral colours, and of visibility approximating to that of the targets seen on service.

(v) **Scope of Competitions.** — Specializing in any one kind of shooting should be discouraged. Competitions for trained soldiers should include not less than three different forms of shooting, such as snapshooting, rapid firing, observation, appreciation of fire limits, etc., with as much variation of targets and conditions as can be conveniently arranged, according to the facilities available.

(vi) **Rate of Firing.**—Conditions for soldiers with more than one year of service should never permit of a slower rate than three rounds a minute for a series of shots, exclusive of time taken for signalling. In deliberate shooting, the best military shot is probably the man who, in skirmishing, first applies an effective shot to a target at unknown range. In rapid firing, the sighting to be used would very often be communicated to the soldier on service, and a high rate of fire, combined with reasonable accuracy, would be expected from him.

(vii) **Coaching.**—Coaching should never be allowed, but individual soldiers in observation and skirmishing competitions may be allowed to work in pairs, giving mutual assistance.

(viii) **Rifles and Aids to Shooting.**—It is essential that in competitions open to the rank and file, competitors should be allowed to fire only with a rifle in charge of their unit, and no departure from the regulations governing the painting of sights, use of slings, provision of wind flags, targets, rifle accessories, etc., is to be permitted in service-rifle competitions.

CHAPTER X

INSTRUCTION ON MINIATURE RANGES, INCLUDING RANGE AND FIELD PRACTICES

Section 70.—General Remarks.

1. Instruction on Miniature Ranges.—(i) Instruction on miniature ranges is in no sense a final training, but it is a useful and economical preparation for service shooting—especially useful where range accommodation is distant or altogether lacking. It should be commenced during the recruit's training, when frequent visits should be made to the miniature range, and the lessons of aiming, pressing the trigger, declaring the point of aim on discharge, etc., should be illustrated practically by firing at elementary targets.

(ii) **Object of Instruction.**—Instruction should be carried out on the same principles as on open ranges. It should be progressive, and may with advantage precede instruction on open ranges. Instruction and firing may be carried out throughout the year; but if this work on miniature ranges is done during the winter months it will prove a useful preparation for subsequent practice on open ranges and for field training in the spring and summer months (see *Drill and Field Training* of this series, Sec. 29, para. 1).

2. Scope of Training.—The instruction, which may be carried out with the Solano Target and Landscape targets is more or less identical in scope with that which can be carried out on open ranges. It must be remembered, however, that the effects of varying light, wind, and other atmospheric influences are absent on miniature ranges, that instruction in judging distance is not possible [see

Sec. 72, para. 2 (iii)], that firing with sights adjusted for different ranges can only be carried out to a limited extent, and that the general conditions under which training takes place are artificial and easier as compared with training on open ranges.

3. Rifles.—The rifles used should be service pattern, ·22-inch R.F., or aiming or Morris tubes used in service rifles with regulation sights. Service rifles must be used, so that the firer may become accustomed to the weight, length, bolt action, and sighting of the weapon he will use in war. Unless this principle is adhered to, practice on miniature ranges cannot be regarded as satisfactory preparation for service shooting. *Rifles must be "harmonized" both for firing at targets direct or with elevation in landscape practices according to the directions laid down in Appendix, V. Rifles must also be cleaned after every ten to fifteen rounds, otherwise they become inaccurate.*

4. Windgauge.—The windgauge may be used to represent wind, and the firers taught to aim off so as to correct the deflection given, acting sometimes on their own judgment, sometimes according to orders for fire direction.

5. Cover.—Cover of various kinds can be improvised at the firing-point with sandbags, screens, or other available material.

6. Empty Cases.—Empty cartridge-cases and lead should be collected, and may be sold at market rates.

7. Precautions.—(i) As the ·22 cartridge used on miniature ranges has considerable power, every precaution must be taken to insure safety. *Rifles must be laid down at the firing-point unloaded and with the breech-action open, and firers must stand clear whenever it is necessary for anyone to be in front of the firing-point.*

(ii) A non-commissioned officer will be placed in charge of each range, and will attend whenever any practice takes

place. Firing will take place only during the hours fixed by the commanding officer.

(iii) No person, except the officer or non-commissioned officer in charge, or the marker, is to pass from the firing-point up to the target during practice. Should it be necessary to stop firing, the same precautions are to be taken as at rifle practice.

(iv) Every possible precaution must be taken to avoid accidents, the strictest order and discipline being maintained at the firing-point. When practice takes place on a classification range, the same orders for safety, etc., are to be observed as when service ammunition is used.

(v) In practices combining firing and movement, the non-commissioned officer in charge of the range will examine the rifles to see that they are not loaded before movement is commenced.

Section 71.—Targets.

1. Standard Equipment.—(i) The various targets of the standard equipment to be used for miniature range instruction are described in Appendix, VII, the information in which must be carefully noted. It is important to avoid confusing the Solano Target when used with scenery, etc., as shown in Figs. 55 and 56, with various Landscape targets when fixed to the Solano Target for instruction as in Fig. 57. The points of difference between the Solano and Landscape targets mentioned in the following paragraphs must also be noted.

(ii) The scenery, scenic accessories, and Solano figures of the Solano Target are all correctly drawn to scale for 25 yards, and at that distance give correct impressions of

what they represent. Landscape targets are not all drawn to scale for 25 yards, *but they must always be used at this distance when possible.*

(iii) On the Solano Target the various features of the scenery, including background and details, as well as the position of troops, can be altered quickly to any extent. The features of landscape targets cannot be altered, therefore they should be changed frequently, as they lose their value when their features become well known.

(iv) In firing at the Solano Target when fitted with scenery, the bullets *strike the objective aimed at.* In firing at landscape targets rifles must be given elevation so that bullets *strike a screen above the landscape,* not the objective aimed at (Fig. 58).

(v) The Solano Target, with or without scenic effects and figures, can be used for the whole scope of the instruction in this chapter, and for all range and field practices. The scope of instruction which can be carried out on landscape targets is strictly limited, and does not include important branches of elementary training nor range and individual field practices. Firing at landscape targets has the advantage of practising men in the adjustment of sights. On the other hand, landscape target practice lacks elements of realism and surprise, as it does not include arrangements for representing the movement of troops at different distances, and does not afford practice in watching the front for the appearance of targets representing troops, discerning and opening fire quickly at such targets, and in marking down, snapshooting, and rapid firing at moving and disappearing targets, especially within close range, which has proved of such vital importance in modern battles (see Preface, paras. 4 and 5).

2. Elementary Targets.—(i) The elementary bull's-eye and other targets for use in miniature range instructional practices should be similar to those used on the classi-

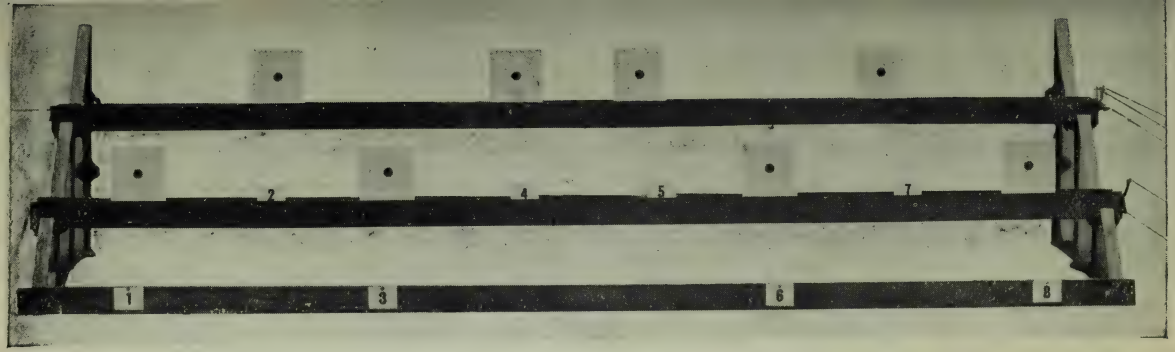


Fig. 53.—Solano Target, Mark I, arranged for Elementary Practices. (*See Appendix, Sec. VII., para.* 2)

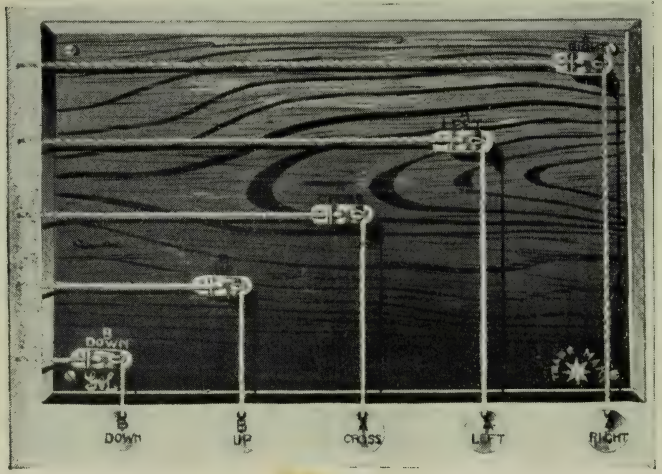


Fig. 54.—Solano Target—Cleat Fitting with Cords which operate Mechanism attached. (*See Appendix, Sec. VII., para.* 2.)

To face p. 206.

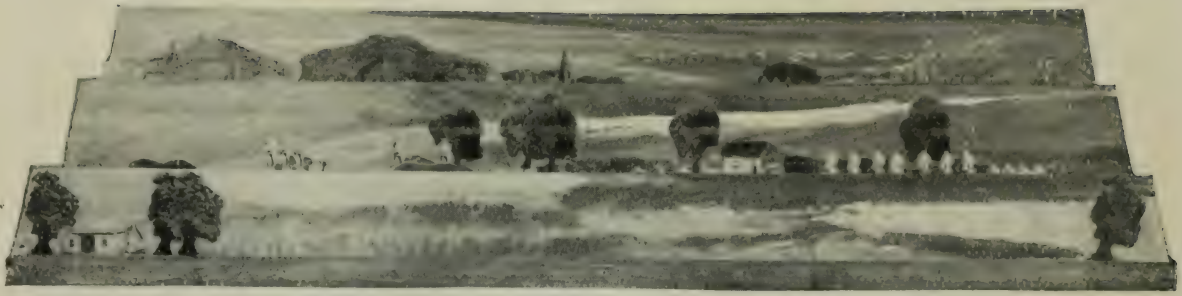


Fig. 55.—Solano Target, Mark I, arranged for General Instruction or for Firing Field Practices, with Scenery and Scenic Accessories (Type A), and with Solano Figures representing Troops at Different Ranges. (*See Appendix, Sec. VII., paras. 3 to 5 inclusive.*)

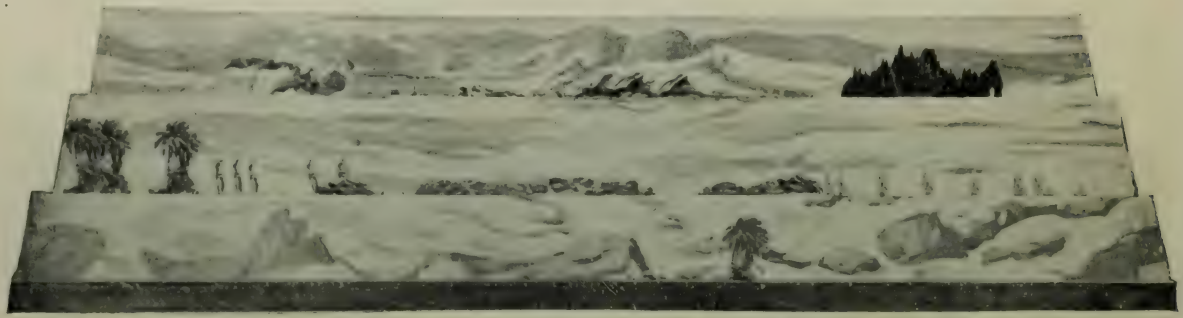


Fig. 56.—Solano Target, Mark I, arranged for General Instruction or for Firing Field Practices, with Scenery and Scenic Accessories (Type C), and with Solano Figures representing Troops at Different Ranges.

To face p. 207.

fication range, but are supplied reduced to the correct scale.

3. Regulation Figure Targets include those in the list in Appendix, VII, para. 5. Targets representing troops advancing in close formations, such as those shown in the Preface, p. ix, may be improvised by cutting strips of card to the required length. The height of the card for various distances, scaled for 25 yards, is as follows: 400 yards, 4 inches; 600 yards, 3¾ inches; 800 yards, 2 inches; 1,000 yards, 1 inch. To these measurements ½ inch should be added in every case for the base held by the clips of the target. Brown or grey card should be used.

(iii) *It must be noted that if figures are made with card which is not sufficiently thick, the impact of the bullet will not cause them to fall when fixed in the falling clips of Tier B of the Target* (Appendix, VII, para. 2).

4. Solano Elementary and Instructional Targets.—These targets have been officially approved by the Army Council for miniature range practices (see Appendix, VIII).

5. Nomenclature of Targets.—In the subsequent Sections of this chapter the Solano Target will be referred to as **The Target,** Figure Targets as **Figures,** and Landscape Targets as **Landscapes.**

Section 72.—Preliminary Training

1. Instruction to Precede Firing.—(i) As already stated, range and field practices carried out before men have been thoroughly instructed in preliminary training will merely result in waste of ammunition. Therefore, before firing on miniature ranges commences men should be thoroughly trained in the following duties: (*a*) Quick and accurate adjustment of sights; (*b*) laying an absolutely correct aim from aiming-rest at easy aiming-mark; (*c*) correct trigger pressing; (*d*) assuming correct loading and firing positions,

including adjustment of sights, aiming, and release of trigger without disturbing aim.

(ii) Particular subjects of instruction which relate to different firing practices should precede them as follows:*

(*a*) *Before firing from cover:* Adapting the firing position to different kinds of cover.

(*b*) *Before application practices:* Aiming-off; the extent being reckoned by the breadth of the aiming-mark as ordered, and aim being laid from aiming-rest.

(*c*) *Before firing at moving targets:* Aiming-off for movement at crossing figures on the Solano Target; aim being tested with aim-corrector.

(*d*) *Before snapshooting practices:* Combining rapidity with accuracy of aim; aim being tested with aiming-disc.

(*e*) *Before firing at the Target with scenery and figures or at landscapes:* Marking down an enemy, and aiming at ground and service targets; aim being laid from aiming-rest at points or targets indicated.

2. Instruction in Aiming.—(i) This training can be carried out on the Target without scenery (Fig. 53), as described in Chapter III. *Elementary training* should be carried out as described in Sec. 70, para. 1. *Aiming at service targets and ground* can be taught on the Target with scenery and figures and on landscapes as described in Sec. 19, para. 2 (ii). *Marking down an enemy* can be taught on the Target with scenery and figures as described in Sec. 19, para. 3 (ii), a number of figures representing men at different distances being exposed from behind cover or in the open to represent the movements of the fatigue-men.

(ii) *Aiming-off for wind* can be taught on the Target with scenery and figures as described in Sec. 20, para. 4, figures representing men at different distances instead of fatigue-men. *Aiming up and down* may also be taught

* See also Sec. 15, para. 3.

as above according to the instruction laid down in Sec. 21, para. 3, figures representing men at various distances being exposed on Tiers A and B to represent an advance or retirement in the place of fatigue-men. *Aiming-off for movement* can be taught with the crossing figures on the Target as described in Sec. 22, para. 1.

(iii) *Rapid adjustment of sights* can be taught on the Target with scenery and figures by exposing a number of figures representing men at different distances. The distance of each figure will not be given. Men will adjust their sights for the distance at which they estimate it to be. The correct range of the figure will then be given, and the men will declare their estimate. As the figures are correctly scaled to size for 25 yards range, this practice will help to accustom the eye to the appearance of men at different distances, and so help to some extent to train them in judging distance, though it cannot be considered wholly satisfactory for this purpose for the reasons given in Sec. 70, para. 2.

3. Instruction in Firing—(i) **Elementary Training.**—This training can be carried out on the Target without scenery, according to the directions laid down in Sec. 24 and the rest of Chapter IV.

(ii) **Vulnerability of Different Firing Positions** (Sec. 26, para. 1).—This can be illustrated on the Target with the aid of figures representing men in the standing, kneeling, and lying positions at various distances. Figures in the standing and lying positions respectively are shown at various ranges in Figs. 55 and 56, arranged on Tier B of the Target.

(iii) **Need for Avoiding Unnecessary Movements in Loading and Firing** (Sec. 30, para. 1).—This important rule can be illustrated on the Target with scenery and a number of figures representing men in various firing positions at different distances, disposed either singly or in groups in the open or

partly behind cover such as bushes, rocks, walls, etc. The figures should be placed in front of background which harmonizes with their colour, so that they are invisible to the naked eye when motionless. The mechanism should then be operated so as to move the figures slightly to demonstrate to the class (*a*) that a figure which is invisible to the naked eye while motionless catches the eye through movement, and (*b*) that while quick movements may escape the eye, and even if seen may make marking down difficult, movements prolonged even for a short time catch the eye and facilitate marking down. This object-lesson will emphasize the rule that movements in the open should be confined to those which are absolutely necessary, and that these should be made smartly.

(iv) **Firing from Cover.**—This instruction can be practised on miniature ranges, according to the rules laid down in Sec. 31, para. 4, with cover improvised by the use of sandbags, etc. Care must be taken to see that the firing positions are correctly adapted to different forms of cover. The need for keeping the eye fixed on the target when firing from cover can be illustrated on the Target by the use of scenery and disappearing and crossing figures representing men at different distances. The correct and incorrect method of using various kinds of cover can also be illustrated on the Target, together with faults such as firing over instead of round the side of cover when this is possible, undue exposure, and unnecessary movement. The Target can also be used with scenery and figures for lectures on the choice of cover and the advantages and disadvantages of different kinds of cover according to the instruction laid down in Sec. 31, para. 3 (ii) to (iv) inclusive, and para. 5.

4. Visual Training—(i) **Discernment of Targets.**—Training can be carried out on the Target as described in Sec. 34 with different types of scenery and figures representing both

men and bodies of troops in different formations at various ranges. The methods of instruction described in paras. 3 to 8 of this section, inclusive, can be carried out on the same principle as in training on the ground.

(ii) **Effect of Background on Visibility.**—Figs. 55 and 56 illustrate object-lessons in the effect of background on the visibility of service targets. For instance, lying figures in front of the hedge to the left of the tree on the left of the white house in the foreground of Fig. 55 are hardly visible at close range in the open, while a khaki figure near the right edge of the dark wood to the right of the hills in Fig. 56 is distinct, though it represents a man 1,400 yards away, while the rest of a line of similar figures coloured grey extended to his right in front of the wood are invisible. It must be remembered that in photographic reproduction the visibility of the figures is exaggerated as compared with their visibility against the scenery when observed with the naked eye at 25 yards.

(iii) Figures which are invisible to the naked eye against the scenic background of the Target can be made distinctly visible by holding a white piece of paper behind them to throw them into sharp relief. This object-lesson will illustrate the manner in which a sky-line or a sheet of water, for instance, affects the visibility of object seen against such backgrounds. The effect of movement on visibility has been dealt with in para. 3 (iii) of this section.

(iv) **Use of Field-Glasses.**—This can be practised as described in Sec. 34, para. 6.

5. Military Vocabulary and Study of Ground.—This instruction can be carried out on the Target with scenery and figures, including those which represent troops in different formations, artillery, transport, etc., and also on Landscapes according to the rules laid down in Sec. 35, paras. 3 to 6 inclusive.

6. Range-Cards and Range-Marks (Sec. 40).—The Target with scenery and also Landscapes may be used for lectures on the choice of features of ground for taking ranges, and for the preparation of range-cards and range-marks in attack and defence.

7. Observation of Fire.—Observation of fire can be practised on miniature ranges as described in Sec. 73, para 4.

8. Fire Direction and Control—(i) **Lectures.**—Lectures on organization for fire action and the tactical application of fire, based on the instruction laid down in Chapter VI, can be illustrated on the Target with scenery and figures, and also to some extent on Landscapes. These lectures should include subjects such as allocation of frontages and objectives to fire-units, indication of the limits of sectors by description points, justification for opening fire, choice of targets, concentration and distribution of fire, mutual support, surprise, and use of rapid fire [see Sec. 74, para. 5 (iii)].

(ii) **Description and Recognition of Targets.**—This instruction should be carried out as described in Sec. 45 on the Target with scenery and figures, and on Landscapes. In training fire-unit commanders in the description of targets on the Solano Target the apparatus should be arranged beforehand, so that the instructor is able suddenly to expose targets representing bodies of troops at different distances in various parts of the field of fire (see Sec. 74, para. 4).

9. Fire Discipline.—Men may be practised in the duties of fire discipline, including passing fire orders, concurrently with the training of fire-unit commanders as described in Sec. 47, paras. 8 to 11 inclusive. They may also be practised in working in pairs during exercises in fire discipline, and by individual field practices and observation practices.

Section 73.—Range Practices.

1. Arrangement of Target.—The arrangement of the Target for grouping and application practices is shown in Fig. 53. This arrangement must be modified if the practice is an instructional one, fewer targets being used, as it may not be found possible to accommodate eight firers and eight instructors at the firing-point at the same time. In this case targets should be placed on Tier A only. The arrangement of the Target for observation practices is described in Appendix VII,, para. 6, and shown in Fig. 57.

2. Grouping Practices.—The dimensions of the rings to be used in measuring groups in grouping practices fired on miniature ranges are given in Sec. 49, para. 6 (xi). Instruction will be carried out on the principles laid down in Sec. 52, and Sec. 56. The conditions of practices are laid down in Tables A and B.

3. Instructional Practices.—The conditions of these practices are laid down in Tables A and B.

4. Observation Practices.—These practices can be carried out with figures to practise men in the duties described in Sec. 47, para. 4. The range may be estimated by the size of the figure fired at, and aim corrected by observing the results of fire as the bullets strike the sawdust bank or paper screen (see Sec. 74, para. 6, Practice No. 4).

Section 74.—Field Practices, Night Firing and Competitions.

1. Arrangement of Target and Number of Firers.—The arrangement of the Target for individual and collective field practices is shown in Figs. 55 and 56, and fully described in the *Official Handbook* mentioned in the

Appendix, VII, para. 1. Targets may be arranged on both tiers. If necessary, as many as eight men may fire individual field practices at the same time. Six or eight men under a fire-unit commander is a convenient number for firing collective field practices either on the Target or landscapes. The Firers may represent a single fire-unit under its commander, or be divided into two or more fire-units, each under its own commander. The arrangement of landscapes for collective field practices is shown in Figs. 57 and 58, and described in the *Official Handbook* referred to above.

2. Conditions of Practices.—(i) The conditions of practices as laid down in this chapter may be varied at the discretion of the instructor to suit the skill of firers. Instructors should encourage fire-unit commanders and men to devise the conditions of practical individual and collective field practices. Interest will be added to a practice if men are allowed, under his supervision, to arrange the scenery and place targets in position for practices to be carried out by their comrades. Before commencing, the object of each practice will be explained to the firers by the instructor.

(ii) After firing, the squad will proceed to the Target, when the results of firing will be criticized and the causes of failure discussed. Hits on figure targets will be counted for scoring according to the rules laid down in the field practices in Chapter VIII and in Appendix, VI, paras. 4 and 5. Rifles are to be loaded before or after commencement of practice or appearance of targets, as ordered. Movement may be carried out by running distances representing an advance either outside the range or between firing-point and butt, *due precautions being taken to avoid accidents.*

3. Individual Field Practices — (i) **Demonstrations.** — Individual field practices may with advantage commence with demonstrations carried out with or without firing on

the Target, arranged with scenery aad figures to illustrate lectures on important subjects, such as justification for opening fire, choice of targets, and the duties of men working in pairs.

(ii) **Justification for Opening Fire.**—For example, justification for opening fire may be illustrated by the following object-lesson, which will also help men to recognize the limit of individual fire, and explain the need for collective fire beyond close range. Figures representing infantry lines in extended order at 2,000, 1,800, 1,600, 1,400, 1,200, 1,000, 800, 600, and 400 yards, may be exposed on Tiers A and B to represent the advance of an enemy in attack. All the figures will be shown against background which harmonizes with their colouring. The difficulty of discerning targets beyond close range will be demonstrated. The difficulty of estimating the range of the figures beyond close range by the difference in their size, even when difficulties due to atmospheric influences and movement are absent, will also be indicated. Finally, a good shot may be told off to fire five rounds at a 1,000 yards figure ; five rounds at a 600 yards figure ; and five rounds at a 400 yards figure, to illustrate the limit of probable assurance of fire effect fom individual fire, and to demonstrate the principle which underlies justification for opening individual fire—namely, that such fire must not be opened unless there is at least probable assurance of effect.

(iii) **Choice of Targets.**—The principle underlying the choice of targets in individual firing may be illustrated in the same manner by arranging figures on the Target so as to represent more or less favourable or important targets between which firers may commonly have to choose. For instance, figures representing a line of men in extended order may be arranged so that the intervals between the men in some parts of the line are considerable, while in others they are crowded together, shoulder to shoulder (see footnote,

p. 226). Here the thickest part of the line is the more favourable target. Again, targets which are distinctly visible owing to the effect of background are more favourable than those which are rendered indistinct owing to this cause. Targets consisting of men in the standing position are, other conditions being equal, more favourable than those in the kneeling and lying positions, and men in the open are obviously more favourable targets than those partly concealed behind cover, especially if it affords protection from fire. These object-lessons illustrate the principle underlying the choice of targets—namely, to select the target which gives the greatest probable assurance of fire effect, or which in any given situation is the most important.

(iv) Object-lessons illustrating other important points may be arranged on the Target by instructors on the same principle as the above examples.

(v) **Conditions of Practices.**—*The Individual Field Practices Nos. 1 to 6 on pp. 185-188, Chapter VIII, can all be adapted with necessary modifications as to targets, numbers firing, etc., for firing on the Solano Target with scenery, scenic accessories, and figures.* The following are examples of other individual field practices which can be carried out on the Target, and are suitable for both instruction and competitions. Firing should be carried out in the different firing positions from behind cover, as well as without cover, or rest for arms or rifle.

Individual Field Practices on the Solano Target.

No. 1.

Object: To teach men to open fire with effect quickly.
Rounds: 6 per man.
Targets: 2 per man—one 300 yards head and shoulders, and one 400 yards standing figure on different tiers.

Directions: Each target to be exposed singly in any order, 3 times for 5 seconds, at uncertain intervals of not less than 10 seconds. 1 round to be fired on each exposure.

No. 2.

Object: To teach men to open fire with effect quickly and to aim off.

Rounds: 5 per man.

Targets: 1 per man—400 or 600 yards standing figure.

Directions: The figures will be arranged on the carriers of the crossing mechanism on Tier A. Scenic accessories, such as houses, trees, foliage, etc., will be arranged on the Target so as to conceal the figures at their starting-points, and also along the *front groove* of the Tier across which the figures will be moved with irregular intervals of some 6 to 12 inches between them. The figures will be moved from the concealment of cover to represent an enemy's scout doubling across the firer's front from cover to cover. On disappearing behind each successive piece of cover the figures will be halted for an uncertain time, not less than 5 seconds, after which they will be retired or advanced to the shelter of the nearest cover, when they will again be halted. Each figure will be exposed in this manner 5 times. 1 round will be fired on each exposure while the figure is in motion.

No. 3.

Object: To teach men to mark down an enemy.

Rounds: 6 per man.

Targets: 2 per man—400 or 600 yards standing figure.

Directions: One figure on each tier of the Target fixed to clips either without cover in front or behind cover which affords protection from fire, such as rocks, a wall, or a bank. The cover must not conceal more than half the figure when exposed. At first cover may be isolated to facilitate marking down, but as progress is made it should be continuous. Each target to be exposed singly for 3 seconds in any order and at uncertain intervals of not less than 10 seconds, then disappeared for 10 seconds, and then exposed again for 4 seconds. 1 round to be fired at each target on second exposure. This practice can also be carried out with the men working in pairs and taking it in turns to fire and to help to observe and mark down.

No. 4.

Object: To teach men to fire at ground.
Rounds: 3 per man.
Targets: 1 per man—400 or 600 yards standing figure.
Directions: The figure must be fixed to clips on either tier behind cover which does not afford protection from fire, such as a bush or hedge. The cover must not conceal more than half the figure when exposed. At first, to render marking down and aim easy, cover may be isolated, such as a bush, but as progress is made it should be continuous. Each figure will be exposed for 3 seconds and then disappeared to represent a man advancing and taking cover. 10 seconds will be allowed for firing 3 shots at the ground line of the spot marked down for the position of the figure behind cover. This practice can also be carried out with the men working in pairs and taking it in turns to fire and to help to observe and mark down. Hits may be checked as follows—on the back of cover immediately in front of the figure an outline in pencil must be drawn of its head and shoulders to represent the figure in the lying position behind cover. The shot-holes will then show whether hits have been scored.

No. 5.

Object: To teach men to snapshoot.
Rounds: 6 per man.
Targets: 3 per man—300 or 400 yards head and shoulders figures and 400 or 600 yards standing figures.
Directions: A great variety of these practices can be arranged, and men should be encouraged to devise the conditions. Targets must be concealed on the moving and disappearing mechanism Tier A and on Tier B behind cover such as walls, rocks, trees, hedges, bushes, houses, and cottages (see Appendix, Sec. VII, para. 4). Figures will be exposed to represent men firing over cover and round the side of cover. The doors and windows of the larger houses and cottages may be cut out and disappearing figures exposed for short intervals to represent men firing from them as in *street fighting*. Targets may also be exposed to represent men moving quickly across open spaces between cover such as trees, etc., to represent targets seen in *wood fighting*.

Men will fire from behind cover, care being taken to see that they watch ground while waiting to fire in correct positions with the minimum of exposure, and that all unnecessary movements in loading and firing are avoided. Men will be trained to aim and fire immediately on the appearance of the target with the minimum of exposure while doing so, and to take cover, load, and resume their watch for targets as quickly as possible after firing. Each target will be exposed twice for 4 seconds. They will be exposed singly in any order at intervals not exceeding 10 seconds. 1 round will be fired on each exposure. They may also be exposed simultaneously to test the judgment of men in the *choice of targets*.

No. 6.

Object: To teach men to combine rapidity with accuracy of fire.

Rounds: 5 per man.

Targets: 1 per man—400 or 600 yards standing figure.

Directions: On the exposure of the target men will fire 5 rounds as rapidly as possible. The time taken by each man in firing 5 rounds will be checked. Accuracy must not be sacrificed for rapidity, and hits scored will be more important than the time taken in firing.

No. 7.

Object: To teach men to combine fire and movement.

Rounds: 6 per man.

Targets: Any of the following: (*a*) A row of Solano figures representing a line of loopholed head-cover entrenchments. (*b*) A row of 300 or 400 yards head-and-shoulder figures representing men firing from a bank or open trench. (*c*) A row of low bushes representing the line of a screened entrenchment. (*d*) A stone wall marked with loopholes or with head-and-shoulder figures exposed at intervals to represent men firing over it. (*e*) A row of houses defended from doors and windows. (*f*) Folds of ground, etc.

Directions: The above targets, (*a*) to (*e*) inclusive, may be arranged on either tier; (*f*) will consist of features shown on the scenery itself. The firers will represent a firing-line advancing at close range. Firing will be carried out as follows:

2 rounds will be fired; the men will then run 50 yards and fire 2 more rounds, after which they will run 50 yards again and fire the last 2 rounds.

4. Fire Direction Practices (Sec. 42, paras. 8 and 9, Sec. 47, paras. 2 to 4 inclusive, and Sec. 54, para. 3).—(i) Though officers and N.C.O.'s cannot be trained satisfactorily in the important duties of ranging on miniature ranges, much useful instruction can be carried out by fire direction practices on the target and landscapes, the object of which will be to teach fire-unit commanders and men to work together in some of the principal duties of fire direction, control, and discipline before proceeding to fire collective field practices.

(ii) The object of these practices is to train fire-unit commanders to discern targets quickly, describe them accurately, and give clear, correct fire orders (Sec. 46, paras. 1 to 6 inclusive), and to train men to recognize targets, obey and pass fire orders. Both officers and men will previously have been trained to some extent in these duties. In fire direction practices they should be carried out as a whole under a time limit, reckoned from the appearance of the target to the end of firing or aiming in obedience to fire orders. The time limit should be decreased as progress is made. Observers should also be trained in their duties in these practices, which should be devised so as to train both fire-unit commanders and observers to watch for signals and maintain communication with neighbouring units (Sec. 42, para. 8 (ii) (*b*), and para. 9).

(iii) The target should be arranged before practices with a variety of figures representing various arms and troops in different formations at various ranges (Appendix, VII, para. 5). They should be exposed suddenly for short time limits corresponding approximately to the probable time exposure of such targets on service. Fire-unit commanders should use field-glasses and include ranges esti-

mated by the size of the figures in fire orders. Passing fire orders may be practised by passing them down a line of men to those at the firing-point (Sec. 46, para. 7). This should be done if possible while firing is proceeding. Practices may be carried out with firing or by aiming with rifles on rests for laying aim. Instructors must carefully criticize the work of both fire-unit commanders and men.

5. Collective Field Practices (Sec. 54, para. 4)—(i) **Demonstrations.**—These practices may be preceded by lectures demonstrating some of the *Points for Criticism* set out in Sec. 54, para. 4 (iii), and also points in the instruction laid down in Sec. 35, para. 4 (*Reconnaissance of Ground in Attack and Defence*), Sec. 42 (*Organization for Fire Action*), Sec. 43 (*Effect of Fire at Different Ranges on Various Formations and Objectives*), and Sec. 44 (*Tactical Application of Fire*).

(ii) **Arrangement of Target for Demonstrations.** — Demonstrations should be carried out on the Target arranged with scenery and figures with or without firing to illustrate instruction. The arrangement of the target for lectures and demonstrations affords scope for skill and ingenuity on the part of instructors, and may be used to give practical instruction to N.C.O.'s and men engaged to help in arranging the scenery and figures to illustrate various principles and tactical schemes. The following are examples of simple lessons which may be demonstrated on the Target.

(iii) **Examples of Demonstrations.**

No. 1. Need for Collective Fire. — The instruction laid down in Sec. 11 may be demonstrated by arranging figures on the Target as above described in para. 3 (ii), adding figures representing troops in different formations, artillery and transport at ranges up to 2,500 yards. If the demonstration is carried out with firing, a useful object lesson may be provided as follows. A row of 1,000 and 1,200 yard figures can be arranged on the clips so that when exposed their heads will appear over continuous cover, such as low bushes, to represent men firing from a bank or fold

of the ground. The figures will be arranged against background which renders them invisible to the naked eye from the firing-point. The firers will be told that they have come under the fire of the enemy somewhere to their front, and that the need for replying to it immediately to minimize its effect is urgent. They will depend upon individual firing for fire effect. When they have realized their helplessness, a fire-unit commander will indicate the target and direct fire, the results of which will be noted.

No. 2. Justification for Opening Fire (Sec. 43 and Sec. 44, paras. 3 to 6 inclusive).—This may be demonstrated by various examples carried out with or without firing to illustrate the principle that fire must not be opened in attack or defence without reasonable assurance of effect in regard to the object for which it is delivered. For instance, a number of rounds may be fired at an extended line of 2,000 or 1,600 yard figures, and an equal number of rounds at an extended line of 1,000 and 800 yard figures, to illustrate the greater effect of fire at closer ranges. It must be explained, however, that exceptionally favourable targets may justify the opening of fire at long and distant ranges [Sec. 43, para. 2 (iii)].

No. 3. Choice of Targets [Sec. 54, Note to para. 4 (iii)].—The principle that the more favourable or important targets should be chosen may be illustrated by various examples, as for instance by exposing a line of 800 yard figures so that the heads and shoulders only are visible above cover affording protection from fire, and exposing a line of the same figures upright in the open to one side. If carried out with firing, a demonstration of the effects of converging fire (Sec. 44, para. 11) may be combined with that of the choice of targets as follows: The firers may be divided nto two fire-units of four men each under its own commander. Each unit will deliver deliberate fire for half a minute at a line of 1,000 yard figures on Tier A within its own sector or frontage. A dense line of 800 yards figures will then be exposed in the centre of Tier B to represent a part of the enemy's line which has taken advantage of a covered approach or dead ground to push forward. Both fire-unit commanders will at once divert the fire of half their unit in a burst of rapid converging fire for half a minute at this favourable target while continuing to keep the enemy's line to his front under fire with the rest of his unit for the same time. Results of firing will be compared.

No. 4. Control of Fire as to Rate and Volume (Sec. 44, paras. 14-17 inclusive).—The above object lesson illustrates the principle governing the control of fire as to volume and rate, both of which are increased to get the greatest possible effect against very favourable or important targets. Many other object lessons can be devised on the Target with figures to illustrate the principles of fire control. For instance, against an enemy's entrenchment or firing line under cover, fire at longer ranges will usually be deliberate, while against the dense line of an attack at close range or against very favourable or important targets, especially if they are fleeting, it will usually be delivered in rapid bursts and in as great a volume as possible. The relation between the rate and volume of fire and the object for which it is delivered, and the circumstances under which it is delivered, should be explained and demonstrated in connection with fire control.

No. 5. Concentration and Distribution of Fire [Sec. 44, paras. 8 and 9; and Sec. 54, para. 3 (v) to (vii) inclusive].—The broad principles which govern the concentration and distribution of fire may be illustrated by arranging figures representing troops in different formations, machine guns, etc., at various ranges on the Target, so that men can see the different kinds of targets against which fire will be concentrated or distributed. For instance, against a narrow-fronted column or machine gun fire will be concentrated, while against lines of infantry in extended order or the frontage of a defensive position fire will usually be distributed. Fire may, however, be concentrated if part of a line offers a favourable target through the men failing to keep their extension and crowding together, on the principle that fire should be concentrated against very vulnerable targets or at points where it will produce increased effect.

No. 6. Mutual Support and Covering Fire (Sec. 44, paras. 12 and 13).—The broad principles governing the application of fire in mutual support and covering fire may be illustrated by arranging simple tactical schemes on the Target in the following manner: The firers will be divided into two fire-units, as in Demonstration No. 3. They are supposed to be part of a firing line in attack. To illustrate *mutual support*, one unit will be represented by a line of figures on Tier B, directly in front of it. When the figures are disappeared, the unit they represent is supposed to be halted, and when they are exposed, it is supposed to be

advancing. The enemy's position will be indicated as a definite frontage in front of each unit on the scenery above Tier A, or the scenic accessories on this tier. While both units are supposed to be firing during a halt, the figures on Tier A will be exposed, denoting that one unit is advancing. The commander of the other unit will at once direct fire from part of his unit in rapid fire against the front of the enemy's position to the front of the advancing unit, while keeping the enemy's position to his front under fire from the rest of his unit. To illustrate *covering fire*, a line of figures on Tier B will represent the firing line of an attack, to which the firers are supports on high ground. The enemy's front will be indicated on Tier A. When the figures are exposed, denoting an advance by the firing line, the supports will cover the advance by delivering heavy fire at the enemy's position to the front of the figures.

No. 7. Fire and Movement (Sec. 44, para. 7).—The control of fire in its application to movement may, for example, be illustrated by supposing the firers to be part of a force acting on the defensive against an attacking force, represented by figures on the Target. Considerations relative to opening fire may be studied, together with the control of fire against advancing troops, with the object of obtaining increased effect at closer ranges and attempting surprise (Sec. 44, paras. 17 and 18). The rate and volume of fire in relation to movement may be demonstrated by illustrating by figures arranged on both tiers of the Target the different stages of an attack* in column and extended order formations from 1,600 to 600 or 400 yards range, an advance, and explaining that the rate of fire is usually deliberate when the enemy halts or takes cover, and is increased in rate and volume when his troops present favourable targets during forward movement, more especially to beat them off in the act of assaulting [Sec. 44, para. 16 (i) and (ii)].

No. 8. Organization for Fire Action (Sec. 42).—Before commencing collective field practices, the principles of organization for fire action, so far as it concerns the allotment of frontages and the division of the field of fire into separate sectors for each fire unit should be demonstrated to fire-unit commanders on the Target or on landscape targets. Platoon and section commanders

* See *Drill and Field Training* of this series, Sec. 31, paras. 4 to 8 inclusive.

may be practised in indicating the limits of sectors to their units, after the frontage allotted to their unit in a field of fire has been pointed out to these commanders. The limits of sectors must be indicated in the manner described in Sec. 42, para. 3, and illustrated in Fig. 47. The nature and details of fields of fire should be varied as much as possible to accustom unit commanders to dealing with all kinds of ground. The field of fire may be divided up into two, three, or four sectors, a different unit commander being made to indicate the limits of each sector.

(iv) **Conditions of Practices.** — *The collective field practices on pp.* 188 *to* 192 *inclusive may be adapted for miniature range firing on the Target by modifying the conditions as may be necessary.* The conditions of practices may also be based on the ideas contained in the examples of demonstrations given in para. (iii) above. Instructors should encourage fire-unit commanders and N.C.O.'s to devise simple tactical schemes for collective field practices which, besides training officers and men in the duties of fire direction, control, and discipline, will teach them to give effect to the principles which govern the application of fire. The arrangement of the Target by men for practices to be fired by their comrades may also be used by the instructor for imparting useful practical knowledge. Special attention should be paid in these practices to firing from cover, passing fire orders, and fire discipline generally. The following examples of practices will serve as a guide to instructors with regard to conditions.

(v) **Special Rules.**—Practices will begin with the caution *Commence*, and will end with the order *Cease Fire.* The number, nature, and positions of targets will be unknown to firers, and must be invisible until exposed or moved. Targets may be exposed without warning any time after the caution *Commence*, and the order, time, and duration of exposure or movement will be unknown to firers in every case. All information which will help commanders and men to use their judgment will be given them beforehand, when the object of the practice will be ex-

plained, but no help or suggestion as to the manner in which they will carry out their duties will be told them either before or during a practice. Criticism will not be confined to the points noted in the following examples of practices, but will be general. These examples are purposely made simple, and devised as far as possible to deal with situations which may confront men in the present campaign. They may be varied by Instructors as desired.

Collective Field Practices on the Solano Target.

No. 1.

Object: Test of fire direction and control.

Targets: Tier A (left section) infantry line standing, extended order, 1,200 yards. Right section, infantry line standing, extended order, 800 yards. Tier B (left half) infantry line standing, extended order, 1,000 yards—half of line crowded together.*

Directions: The firers will represent two separate units in neighbouring localities of a defensive position. The target on Tier A (right section) will first be exposed for ten seconds. After a pause, both targets on Tier A will be exposed together for ten seconds. After a pause the targets on Tier A (right section) and Tier B will be exposed together for ten seconds. **Particulars:** The enemy at 1,200 yards is difficult to discern owing to background and undergrowth, and the defence know that he is close to a covered approach which will bring him to 1,000 yards of their line. **Criticism:** (i) *Justification for Opening Fire:* (*a*) By both units on first exposure of 800 yards' target; (*b*) by both units on exposure of 1,200 yards target. (ii) *Choice of Targets and Mutual Support:* By left unit on simultaneous exposure of 1,200 and 800 yards targets. (iii) *Rate of Fire:* (*a*) By both units on first exposure of 800 yards target; (*b*) by left unit at 1,000 yards target. (iv) *Concentration and Distribution of Fire:* By left unit at 1,000 yards target. (v) *Results of Firing.*

* Solano figures representing Infantry Lines consist of strips containing a number of figures at intervals. Lines made of these figures can be crowded together by overlapping two strips and fixing them together in the clips.

No. 2.

Object: Test of fire direction by auxiliary aiming-marks (aiming-off).

Target: A point on the scenery indicated to unit commander as concealing enemy's machine-gun at 1,400 yards.

Directions: Commander is ordered to open fire at once, allowing one, two, or three fingers' breadths for the deflection of right-angle winds of varying strength from left or right. He will select auxiliary aiming-marks for direction of fire and aiming-off under a time limit. **Criticism:** *Choice of description-point. Clearness of fire orders. Quick opening and rate of fire. Results of firing.*

No. 3.

Object: Test of fire direction by anticipatory orders.

Directions: A variety of targets and tactical schemes may be employed for this practice, which may also be made to combine fire and movement. For example, the firers may represent a force in pursuit of retreating troops, and run 100 yards in intervals of firing to represent an advance. At the end of movement prearranged crossing and disappearing targets will be exposed or moved at points previously known to commander, who will indicate them to men, telling them to open fire when target appears without further orders. To develop individual judgment, men will be made to use their judgment in applying fire according to nature and importance of targets. **Criticism:** *Recognition of targets. Quick opening of fire. Application of fire as to rate, volume, concentration, or distribution according to nature of target. Fire discipline.*

No. 4.

Object: Test of individual judgment in applying rapid fire.

Targets: Tier A (left section), infantry line standing, extended order, 600 yards. Line of head and shoulder figures 400 yards on right section. Tier B, dense line standing figures, 400 yards, or strip of cardboard of same measurements.

Directions: Targets will be exposed once separately for 15 seconds each at intervals of 10 seconds between exposures in following order: (i) 600 yards target; (ii) 400 yards head and

shoulders; (iii) 400 yards standing. Men will fire with orders. **Criticism:** *Quick opening of fire. Rate of fire at first, second, and third targets. Fire discipline. Unsteady firing. Results of fire.*

No. 5.

Object: Test of individual judgment in applying fire to a tactical situation.

Targets: Tier A, infantry line standing, 800 yards. Tier B, dense infantry line standing, 600 yards (figures or cardboard strip).

Directions: 600 yards target will first be exposed alone representing attack at close range. 800 yards target representing enemy's supports will then be exposed for 15 seconds, the 600 yards target also remaining exposed for this period. Firers will be told that they will succeed in checking enemy's firing line represented by first target exposed, and will then deal with the situation as it develops without orders owing to sudden loss of their commander at critical moment. **Criticism:** *Quick opening of fire. Discernment of 800 yards target. Proportion and rate of fire diverted from enemy's firing-line to supports. Fire discipline.*

No. 6.

Object: Test of rapid fire

Target: Tier B, dense line of figures or strip of cardboard 400 yards or closer.

Directions: Target will be exposed for 30 seconds to represent an enemy delivering attack from his trenches on firers who are entrenched close to and opposite his earthworks. When practice commences, one firer as observer will watch the front, while others will sit with their backs to target. When the observer gives the alarm, firers will rise and open rapid fire. Arrangements should be made to carry out this practice standing with rifles rested, and if possible by firing from loopholed head cover improvised with sandbags, etc., as shown on p. 82 of *Field Entrenchments* of this series. The practice may also be fired at dusk or with artificial lighting lowered to give the effect of uncertain light. **Criticism:** *Work of observer. Quick opening of fire. Fire discipline. Percentage of hits to rounds fired.*

Fig. 57.—Landscape Target on Frames attached to the Solano Target, in Position for Firing.

("Section Fire" Target.)

To face p. 228.

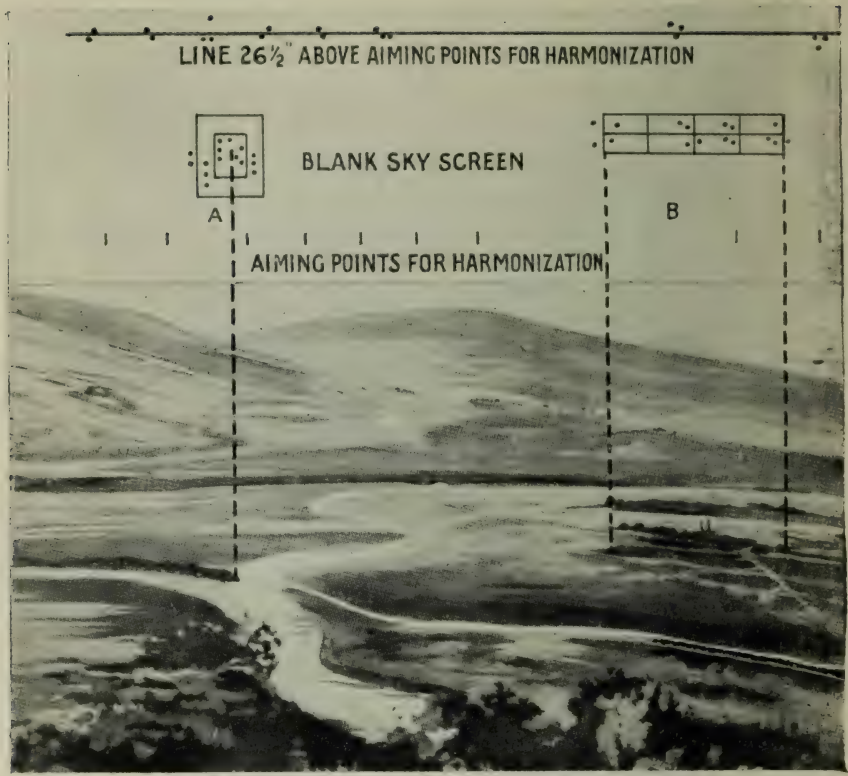


Fig. 58.—Landscape Target Practices. Illustration showing Method of Harmonizing Rifles and the System of Measuring Collective Grouping of Concentrated and Distributed Fire for Scoring. (*See Appendix, V., para.* 2, *and Appendix, VI., para.* 5.)

To face p. 229.

6. Landscape Target Practices.—As already stated, range and individual field practices cannot be carried out on landscape targets. Collective field practices can be carried out on landscape targets with either ·303 or ·22 ammunition on 30 yards and miniature ranges. As progress is made, landscape target practices should be carried out with a time limit for indicating targets, giving and passing fire orders, and firing. When firing at landscape targets, rifles will be given elevation, so that bullets aimed at objectives on the landscapes will strike a blank or shadowgraph sky screen above the whole of the landscape, even if the objective is at the bottom of the landscape (Fig. 57). For method of valuing hits and scoring in these practices, see Appendix, VI, para. 5. The following are examples of collective field practices which may be carried out on landscape targets:

COLLECTIVE FIELD PRACTICES ON LANDSCAPE TARGETS.

No. 1.

Object: To teach concentration of fire.

Directions: Fire is opened on a given point on the landscape as ordered. If the point is clearly indicated and recognized, and if sighting and fire are accurate, a dense group of shot-holes will be made on sky-screen, the point of mean impact being a point the correct height *vertically* above the point of aim [see Appendix, VI, para. 5 (i)].

No. 2.

Object: To teach distribution of fire.

Directions: Fire is opened along a given line of country as ordered. The shot-holes should appear evenly distributed along a line on the sky-screen at a certain height, and immediately above the line of country indicated [see Appendix, VI, para. 5 (ii)].

No. 3.

Object: To teach the use of combined sights.

Directions: As in No. 1, but half the firers will adjust sights 50 yards above and half 50 yards below the range given. Results will show two groups, which would be merged into one group of great depth in the case of fire of sufficient volume, such as that of two platoons, and illustrates the use of combined sights for increasing the zone of effective fire.

No. 4.

Object: To teach observation of fire.

Directions: A point is indicated on landscape (preferably near the top), and a visible* sketch of it is made at any height on the screen and *vertically* above it. The commander will open fire with such elevation as he thinks necessary, and then correct from observation of shot-holes until on the target.

7. Night Firing.—The automatic alignment of rifles may be practised on miniature ranges. Aim may be taken at a strip of brown or grey paper representing a line of standing figures at 100 and 200 yards' distance, scaled down to size for 25 yards, and attached to the landscape target screen faced with blank paper (Fig. 57). Men may also be taught to aim rifles from improvised night-firing rests at objectives on the Solano Target or Landscape Targets. The field of fire containing the objectives may then be concealed by a paper screen, the rifles fired, and results examined. As there is no recoil with the miniature cartridge, this practice will not prove the utility of the rest.

8. Miniature Range Cadet Competitions.—The rules regarding competitions set out in Sec. 69 apply also to miniature ranges. The various practices laid down in this chapter

* This is not necessary on the "Section Fire" Landscape Targets, because the details of each landscape are reproduced in a monotint or shadowgraph facsimile on the sky-screen to be used with it (Fig. 58). Shot-marks are therefore seen grouped on or about the sky-screen facsimile of the objective directly above it.

and Chapter VIII will serve as the basis of various competitions on miniature as well as open ranges. Tests in grouping and application may be found suitable for cadet competitions in elementary forms of shooting. Regulation as well as Solano elementary and instructional targets may be used (see Appendix, VIII).

Cadet Competitions.

No. 1.

Object: To teach cadets grouping under a timed limit when firing from cover, and to train the eye to aim at marks seen against backgrounds of natural tints.

Rounds: 5 per cadet.

Target: Solano Elementary Target No. 1.

Directions: Kneeling. Firing over cover with arm or rifle rested. Two minutes allowed for firing reckoning from the order *Commence.*

No. 2.

Object: To teach cadets to focus the eye on the mark instead of the sights of the rifle.

Rounds: 5 per cadet.

Target: Solano Elementary Target No. 2.

Directions: Lying. Firing round cover with side of rifle rested.

No. 3.

Object: To teach cadets to assume a firing position and open fire quickly with effect.

Rounds: 5 per cadet.

Target: Solano Instructional Target No. 1.

Directions: Firer stands to attention at firing-point. Ten seconds allowed for assuming the lying position, loading, and firing one shot, reckoned from command *Fire.*

No. 4.

Object: To teach cadets to snapshoot.

Rounds: 5 per cadet.

Target: Solano Instructional Target No. 2.

Directions: Lying. Firing round cover. Target exposed six seconds for each shot. Time reckoned from the exposure of the target.

No. 5.

Object: To teach cadets to combine accuracy with rapidity of fire.

Rounds: 5 per cadet.

Target: As in No. 3.

Directions: Lying. Rifle to be unloaded and breech closed until the command *Rapid fire*. Target exposed for thirty seconds, reckoned from command *Rapid fire*.

No. 6.

Object: To teach cadets to combine fire with movement.

Rounds: 5 per cadet.

Target: Solano Instructional Target No. 3.

Directions: Lying. A distance of 25 yards to be run before firing each shot. Fifteen seconds reckoned from the order *Commence* allowed for running and firing each time. One minute to elapse between the firing of a shot and the commencement of the next run.

I. NAMES OF THE PARTS OF RIFLES—SHORT M.L.E., MARK III, AND CHARGER-LOADING M.L.E.

(*a*) **Short M.L.E. Mark III** (Figs. 59 and 60).

1. Blade foresight.
2. Foresight block.
3. Band foresight block.
4. Key foresight block.
5. Crosspin foresight block
5A. Backsight bed.
6. ,, ,, crosspin.
6A. ,, ,, sight spring screw.
7. Backsight leaf.
8. ,, slide.
9. ,, slide-catch.
10. ,, fine adjustment worm wheel.
10A. Windgauge.
10B. ,, screw.
11. Backsight ramps.
12. Seating for safety-catch.
13. Safety-catch.
14. Locking-bolt stem.
15. Bolt.
16. Bolt-head.
17. Striker.
18. Cocking-piece.
19. Striker collar with stud.
20. Bolt-head tenon.
21. Cocking-piece locking recesses.
22. Locking bolt.
23. ,, ,, flat.
24. ,, ,, thumb-piece.
25. ,, ,, aperture sight stem.
26. ,, ,, stop-pin recesses.
27. ,, ,, safety-catch stem.
28. ,, ,, ,, ,, arm.
29. ,, ,, screw threads.
30. ,, ,, seating.
31. Bolt cam grooves.
32. Sear.
33. ,, seating.
34. ,, spring.
35. Magazine catch.
36. Full bent of cocking-piece.
37. Short arm of sear.
38. } Trigger ribs.
39. }
40. Trigger.
41. Trigger axis pin.
41A. Magazine case.
41B. ,, platform spring.
41C. Magazine auxiliary spring.
42. Guard-trigger.
43. Stock fore-end.
44. Spring and stud fore-end.
45. Protector backsight.
46. Handguard front and rear.
47. Spring handguard gear.
48. Lower band groove.
49. Lower band.
50. Nosecap.
51. Protector foresight.
52. Sword bar.
53. Boss for ring of sword-bayonet cross-piece.
54. Swivel seating.
55. ,, piling.
56. Nosecap barrel opening.
57. Inner band.
58. ,, ,, screw.
59. ,, ,, ,, spring.
60. Butt sling swivel.
61. Sword bayonet, pattern '07.
62. Bridge-charger guide.
63. Cut-off.

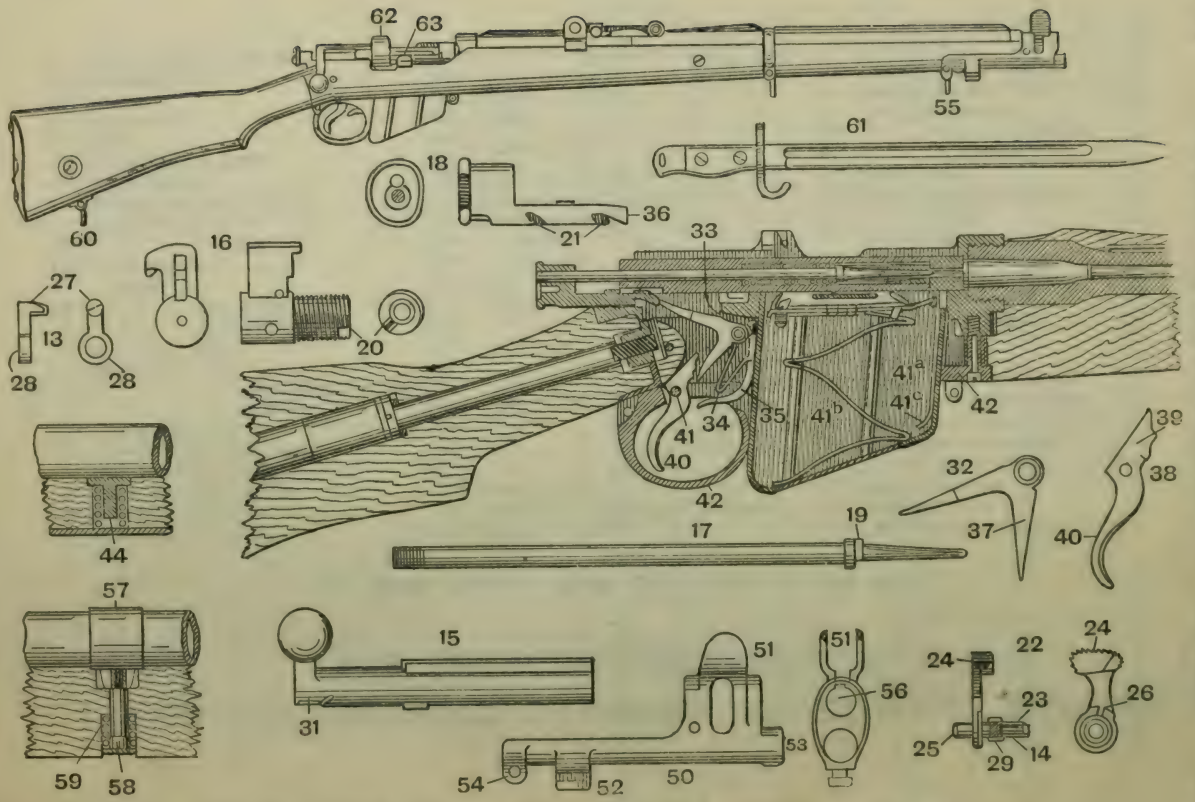


Fig. 59.—Short Rifle, Magazine Lee-Enfield (Mark III).

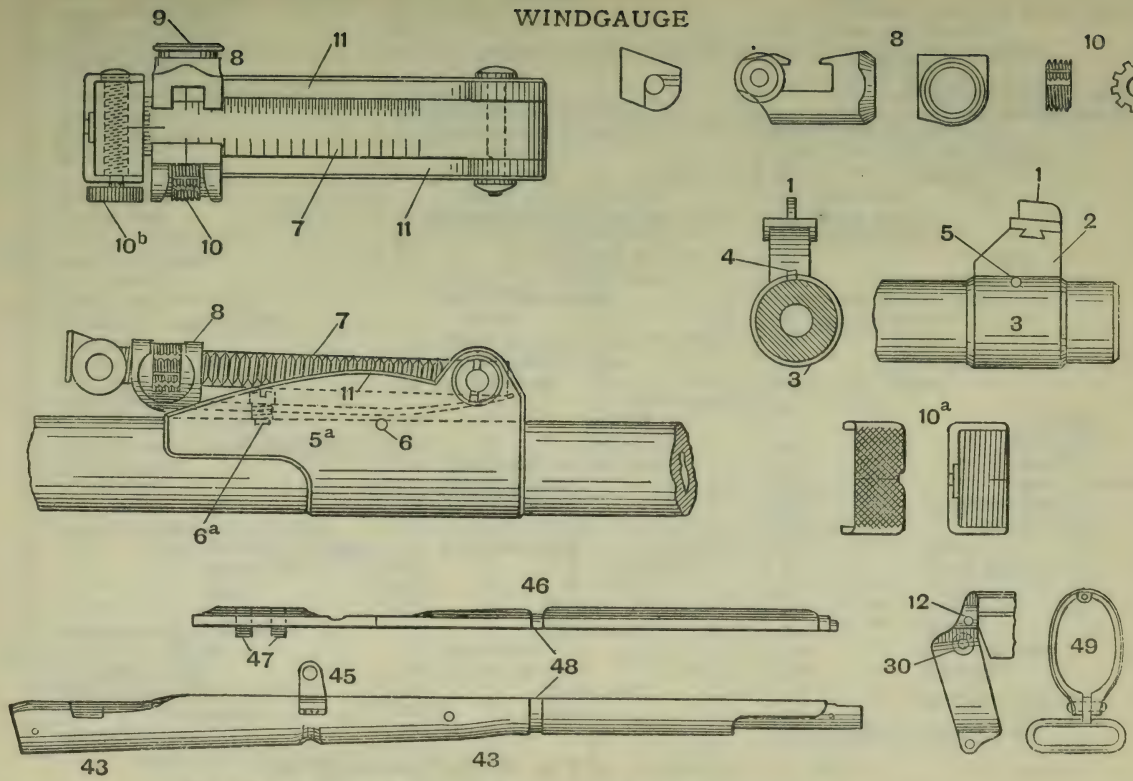


Fig. 60.—Short Rifle, Magazine Lee-Enfield (Mark III).

NAMES OF THE PARTS OF RIFLES SHORT M.L.E., MARK III, AND CHARGER-LOADING—*continued.*

(*b*) Charger-Loading M.L.E. (Figs. 61, 62, and 63)

1. Backsight bed
2. ,, ,, ramp.
3. Aperture sight.
4. Dial sight plate.
5. ,, ,, pointer.
6. Aperture sight peep-hole.
7. ,, ,, pivot-screw.
8. ,, ,, spring.
9. ,, ,, spring ribs.
10. ,, sight cross-cut notches.
11. Pivot aperture sight pointer.
12. ,, screw.
13. Spring disc.
14. Bead pointer.
15. Screwed boss, fixing dial-sight.
16. Centring-pin dial-sight.
17. Index-point of pointer.
18. Bolt rib.
19. Extractor seating.
20. Bolt lug.
21. Tongue of cocking-piece
22. Recess for lug of bolt.
23. Body bead.
24. Retaining catch.
25. Resistance shoulder.
26. Cut-off slot.
27. Body socket.
28. ,, ,, boss.
29. Stock-bolt.
30. Gas escape hole.
31. Bolt-breech.
32. Lever bolt-breech.
33. Lug seating.
34. Long cam groove.
35. Short cam groove.
36. Cam-shaped face.
37. } Cam grooves separating studs.
38. }
39. Bolt-head.
40. ,, tenon.
41. ,, projection.
42. Extractor slot.
43. Extractor.
44. ,, axis-screw.
45. ,, spring.
46. ,, ,, pin.
47. ,, ,, pin-hole.
48. Bolthead hook.
49. Striker.
50. Cocking-piece.
51. Striker collar.
51A. Cocking-piece full bent.
52. ,, ,, half bent.
54. ,, ,, seating for safety-catch.
55. Safety-catch.
56. Striker keeper-screw.
57. Recess in striker for the keeper screw.
58. Safety catch stem.
59. ,, ,, finger-piece.
60. ,, ,, locking grooves.
61. ,, ,, plunger.
62. Seating for plunger and spiral spring of safety-catch.
63. Nipple holes for plunger of safety-catch.
64. Retaining catch spring.
65. Ejector.
66. Sear.
67. ,, screw.
68. ,, seating in body.
69. ,, spring.
70. Trigger.
71. ,, axis pin.
72. Magazine box or case.
73. } ,, platform guides.
74. }
75. ,, stop clip.
76. ,, stop-clip stud.
77. ,, platform.
78. ,, clip stop.
79. ,, tooth.
80. ,, catch tooth.
81. ,, catch.
82. ,, ,, finger-piece.
83. ,, platform plate.
84. ,, ,, plate tongues.
85. ,, ,, spring.
86. ,, ,, auxiliary spring.
87. Cut-off.
88. ,, screw.
89. ,, thumb-piece.
90. ,, catch.
91. Guard-trigger.
92. Screw-guard front.
93. ,, collar.
94. ,, ,, rear.
95. Lower band.
96. Sling swivel.
97. Nose-cap.
98. ,, band.
99. ,, fixing screw.
100. Piling swivel.
101. Diagonal slot in nose-cap to clear the foresight block when assembling, etc.
102. Stock-bolt, plate-keeper.
103. Stock-butt swivel.
104. Oil-bottle, Mark III (latest Mark IV).

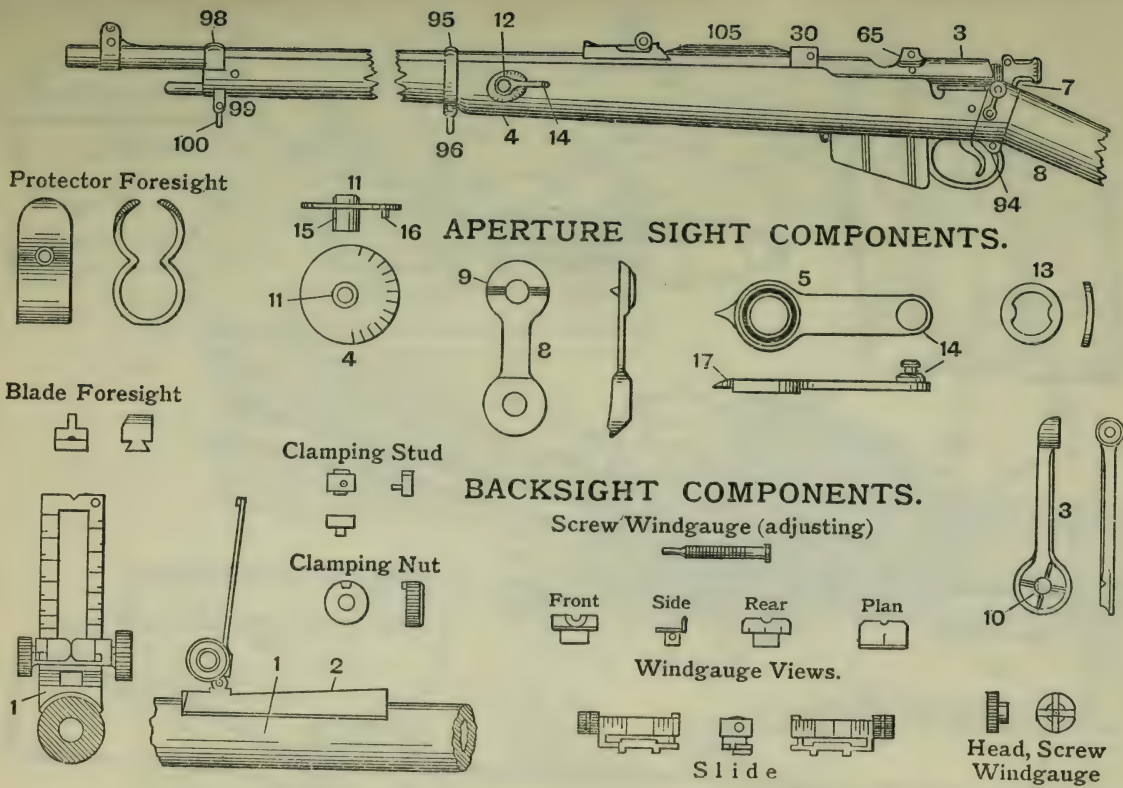


Fig. 61.—CHARGER-LOADING LEE-ENFIELD.

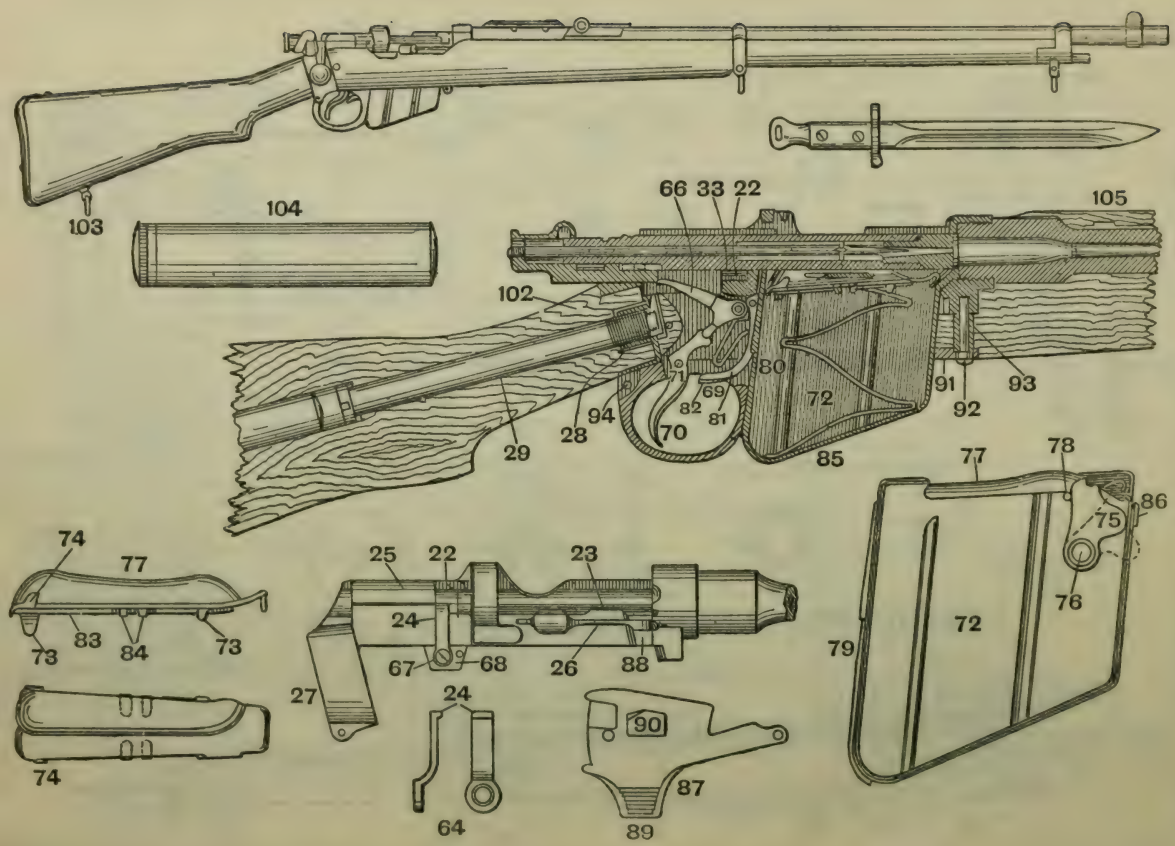


Fig. 62.—CHARGER-LOADING LEE-ENFIELD.

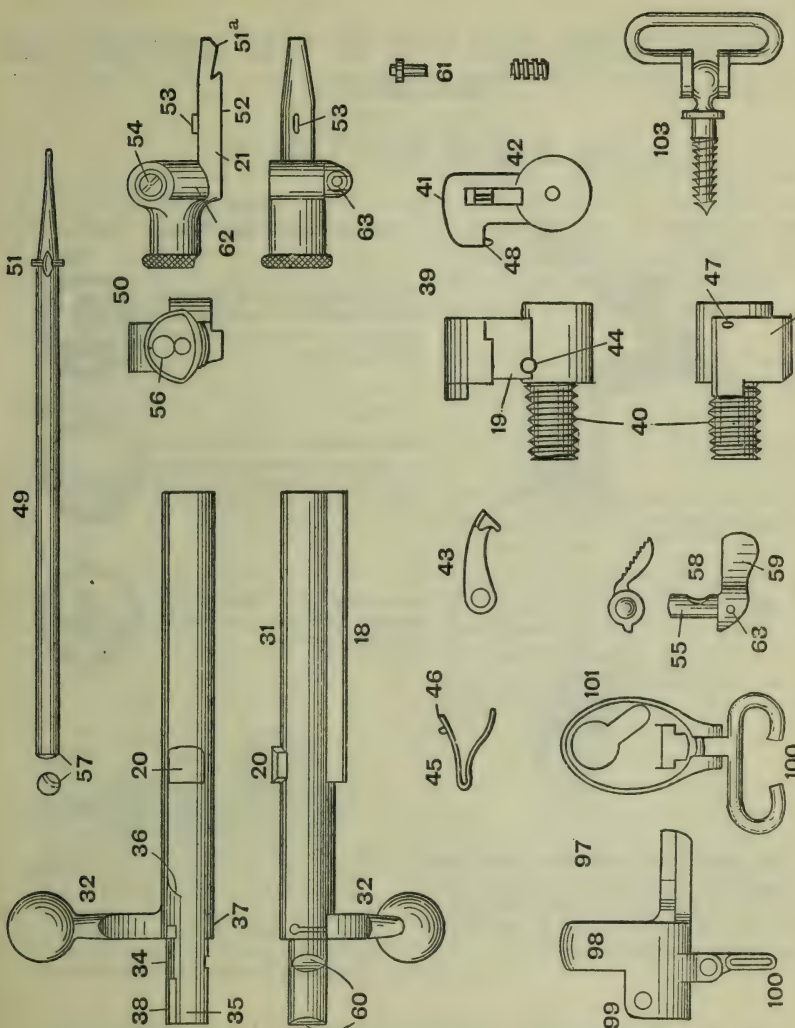
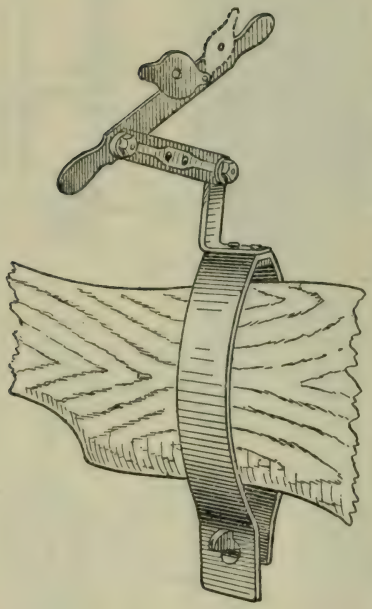


Fig. 63.—Charger-loading Lee-Enfield.

II. DIRECTIONS FOR USE OF THE LEGRET AIM TEACHER.

The Legret Aim Teacher.



This instrument provides a most easy means of teaching the elementary principles of aiming with Military Sights and also enables an instructor to check his pupils faults.

Aims Chart
For use with "Aim Teacher" Mark 1.

No. 1

No. 1. Stage I. *Proper relation of fore-sight to aiming mark. Aim taken at 600 c. point with fore-sight only.*

No. 2.

No. 2. Stage II. *Proper relation of fore-sight and back-sight. Lay on sheet of paper or, sky (just above horizon most convenient)*

No. 3

No. 3. Stage III. *Proper relation between fore-sight, back-sight, and aiming mark.*

No. 4. Stage IV. *Instructor will first lay correct aim as in diagram 3. Rifle is then moved and shutter turned gently to left. Recruit then relays rifle as in diagram 4 Instructor turns shutter gently to right and checks faults. Care must be taken not to move "jointed arm" in this stage.*

Fig. 64.—DIAGRAMS ILLUSTRATING USE OF LEGRET AIM TEACHER.

III. DIRECTIONS FOR USE OF THE AIM-CORRECTOR.

1. This device is illustrated in Fig. 65. It consists of a small steel box moving freely on a stem, so as to enable it to be made level with the back-sight when the latter is set at various elevations. It is secured to the rifle, behind the back-sight, by a spring clip. A piece of smoked glass is inserted into one of the two cross grooves, so that it forms an angle of 45 degrees with the barrel.

2. In placing the aim-corrector on the rifle, the open side of the box may be turned to the right or left, care being taken that, when the glass is inserted in the box, it is placed in the cross-groove, which will cause it to present to the observer, who is opposite the open end, a reflection of the backsight, the foresight, and the mark at which aim is to be taken. If the glass is placed in the wrong cross-groove, the only image reflected upon it will be the recruit's eye.

3. The instructor, who may take up his position on either side of the recruit, can see the alignment of the sights while the trigger is being pressed by means of the reflection in the glass, without in any degree obscuring the recruit's aim. He can see if aim is correctly maintained when the trigger is pressed, or if it is deflected by this act, and can tell whether the recruit has noted and correctly declared any deflection due to faulty trigger-pressing. In certain lights, the image on the glass may be rather indistinct, but with care it is possible to discern it sufficiently clearly for instruction. In correcting errors, the instructor must remember that, when looking in the glass, the reflection, as in the case of an ordinary mirror, is *reversed laterally*, but is *correct vertically*. For instance, if the sight appears upon the glass to the right of the mark, it is actually to the left of it. If, however, it appears high or low in relation to the mark, it is actually above or below the mark.

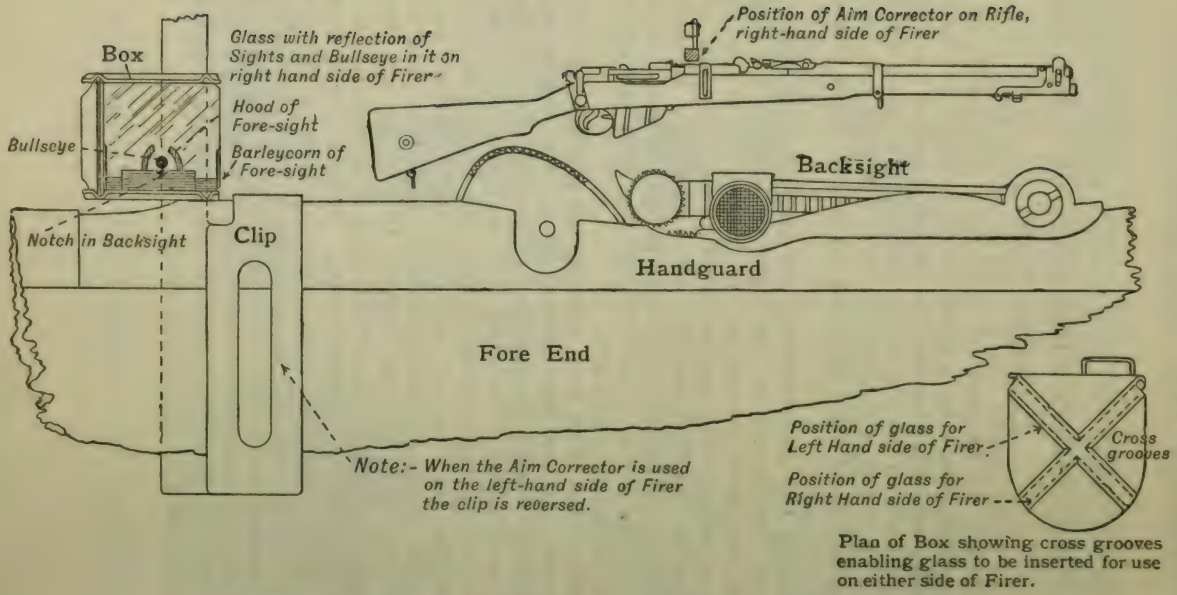

Box
Glass with reflection of Sights and Bullseye in it on right hand side of Firer
Hood of Fore-sight
Barleycorn of Fore-sight
Bullseye
Position of Aim Corrector on Rifle, right-hand side of Firer
Backsight
Notch in Backsight
Clip
Handguard
Fore End
Note:- When the Aim Corrector is used on the left-hand side of Firer the clip is reversed.
Position of glass for Left Hand side of Firer
Position of glass for Right Hand side of Firer
Cross grooves
Plan of Box showing cross grooves enabling glass to be inserted for use on either side of Firer.

Fig. 65.—DIAGRAM ILLUSTRATING USE OF AIM-CORRECTOR.

IV. DIRECTIONS FOR USE OF THE AIMING-DISC.

The aiming-disc is a small rod, bearing a disc of metal or cardboard, painted white, about 1½ inches in diameter (Fig. 66). On the front is a black bull's-eye ½ inch in diameter, in the centre of which is pierced a hole just large enough to admit the point of a pencil. On the back is a bull's-eye, also ½ inch in diameter, placed so that the six o'clock line is just above the hole which is in the centre of the bull's-eye on the front.

The instructor may ascertain the accuracy of the recruit's aim and his power to press the trigger without disturbing aim by the use of the aiming-disc in the following manner: He

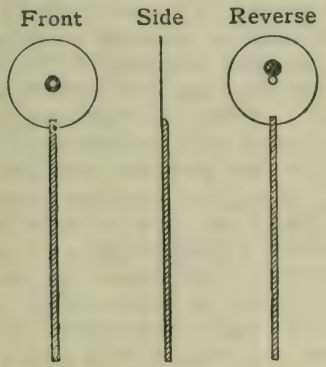


Fig. 66.—AIMING-DISC.

should take up his position in front of the recruit at a distance of about 4 or 5 feet from the muzzle of his rifle when held to the shoulder for firing in the lying position, with his eye to the hole in front of the disc (Fig. 19). The recruit is then instructed to bring the rifle to his shoulder for aiming, to aim and press the trigger at the aiming-mark at the back of the disc.

Through the aperture at the bottom of the bull's-eye at which the recruit takes aim and snaps, the instructor is able to see the recruit's faults of aim, and to note whether his aim is disturbed when the trigger is pressed. The instructor is also enabled to

note the rapidity with which he takes aim and presses the trigger.—This practice is useful to develop in men the power of aiming rapidly and correctly, which is essential for snap-shooting and rapid firing, without the danger of their contracting bad or careless habits through hurried movements.

V. "HARMONIZING" RIFLES FOR MINIATURE RANGE PRACTICES.

1. Rifles are said to be harmonized when their slight individual differences in shooting are corrected by adjustment of sights. This harmonizing or correction of differences in the shooting of the rifles used in miniature range practices is necessary to obtain satisfactory results. *Rifles must be harmonized for firing direct at targets as well as for firing with elevation*, as in landscape practices. With reference to direct firing at targets, it has been found that with service rifles an elevation of 300 yards is necessary to obtain the greatest possible accuracy. Consequently, rifles must be sighted for 300 *yards* before being harmonized for firing direct at targets according to the method described in the following paragraph, aim being taken at the aiming-marks on the *lower* horizontal line, and differences being discovered by the grouping of shots on the aiming-marks—not on the line above. The sighting necessary to correct differences in each rifle will also be recorded on a board hung for reference on the miniature range, as described in para. 3.

2. **Method of Harmonizing Rifles** (see sky screen, Fig. 58).—(i) The following is the method of harmonizing rifles: The rifles selected for miniature range practices must be numbered from 1 on consecutively. Each rifle must be marked with its number. When this is done, a horizontal line must be drawn along the bottom of the blank sky screen. At intervals of about 12 inches along this horizontal line a number of aiming-marks must be painted. The number of aiming-marks must equal that of the rifles to be harmonized, so that there is one aiming-mark for each rifle. At a distance of 26½ inches above the line of aiming-marks another horizontal line must be drawn on the sky screen, which must be visible from the firing-point. This distance has been chosen

because it is sufficient to cause shots aimed at objectives at the bottom of the landscape to clear the top of it and strike the sky screen.

(ii) *Harmonizing Rifles for Elevation.*—Each rifle will then be adjusted for 1,200 yards. Each rifle, thus sighted, will be fired by a reliable shot with regular aim at one of the aiming-marks. The sights of each rifle will be adjusted until shots which strike above or below the upper horizontal line on the sky screen (when it is sighted for 1,200 yards) strike the line itself. When shots fired from all the rifles strike the line after sights have been adjusted in this manner, they are said to be harmonized.

3. Record of Sighting.—The variations of each rifle, if any, from the original sighting at 1,200 yards—or 300 yards in the case of sighting for direct hits—will be noted, and its variations written down for reference against the number of the rifle on a board to be hung on the wall of the miniature range. The following is an example of the record of sighting:

TWENTY-FIVE YARDS MINIATURE RANGE.

Rifle.	Elevation for Direct Hits.	Elevation for Landscape Targets.
1	300	1,200
2	300	1,200
3	350	1,250
4	250	1,150

VI. SCORING AND SIGNALLING.

1. When a shot strikes the target so that the circumference of the mark cuts the outer edge of any ring or figure, it is to be counted as hitting within that ring or figure, as the case may be. No shot is to be counted unless the whole or part of the mark of the bullet is seen on the face of the target. A *ricochet* usually makes a long, ragged hole or mark.

2. Elementary and Figure Targets.—For scoring in Practice 22, Table B, see Note 2 below.

Signal.	Methods of Signalling.	Value of Hit.
Bull's-eye or figure.	Polished metal or white disc placed on shot-hole.	4 points.
Inner (remainder of inner circle).	Black disc waved twice across the face of the target and placed on the shot-hole.	3 points.
Outer (remainder of elementary target) or magpie (remainder of large circle on figure target).	Polished metal or white disc revolved in front of the target and then placed on the shot-hole.	2 points.
Outer (remainder of figure target).	Black disc moved vertically up and down the left of the target and then placed on the shot-hole.	1 point.
Ricochet or miss	Red and white flag shown on the same side as the direction of the miss. If the direction cannot be determined the flag will be waved across the face of the target.	Nil.

NOTE 1.—The scoring bull's-eye on second-class elementary targets is a 12-inch invisible ring.

NOTE 2.—In Practice 22, Table B, a hit on the figure or remainder of inner circle will count 3 points and will be signalled as a bull's-eye. Hits elsewhere on the target will count as in table above.

NOTE 3.—When for any reason it is found to be impracticable to send the firers into the gallery after a grouping practice, the following signals may be used:

Bull's-eye signal denotes a 4-inch group.
Inner ,, ,, 8 ,, ,,
Magpie ,, ,, 12 ,, ,,
Outer ,, ,, 12 ,, ,, with one wide shot.

When the signal has been made, after a short pause, the point of the pole will be placed on the point of mean impact of the group.

3.—Figures No. 3 and No. 6 (*Open Range*).

Signal.	Methods of Signalling.	Value of Hit.
Hit	The figure will be raised above the marker's gallery and twirled.	3 points.
Ricochet or miss ..	—	Nil.

4. Figures (*Miniature Range*).—Scores for hits and misses as in para. 3 above.

5. Scoring in Landscape Target Practices. — (i) A measuring-rod, 26½ inches long, is required to test the accuracy of both concentrated and distributed collective grouping. The following is the method of valuing groups for scoring. When collective fire has been concentrated on any objective on the landscape, the rod is held vertically against the screen with the bottom of it resting on the point of aim. A mark is then made on the sky-screen at the top of the rod. This mark indicates where the centre of the group of shot-holes should be. For instructional practices the groups may be valued on the principle that the smaller the group the greater the fire effect. For competitions two concentric wire rectangles, 5 inches by 4 inches and 2½ inches by 2 inches respectively, may be used for scoring. The rectangles will be placed over the group, their longest sides being vertical, with their centre placed on the mark indicating where the centre of the shot group should be. Every shot in the inner rectangle will then count two points, and every shot in the remainder of the larger rectangle will count one point. For every shot outside the larger rectangle two points will be deducted.

(ii) When fire has been distributed between two points on the landscape, a mark is made 26½ inches vertically above each point, as already described. These two marks are joined by a line parallel to that along which fire has been distributed. A line 1½ inches above, and another 1½ inches below, this line are drawn parallel to it. The ends of these lines are then joined by vertical lines which pass through the two marks joined by the centre line. The rectangle formed in this manner is divided vertically into equal parts, being either one for each firer or one for each fire-unit. Each group of shots fired by a firer or a fire-unit should be found grouped in the proper part of the rectangle. Each shot in its proper part will count two points. For each shot outside its proper part two points will be deducted. For every part of the rectangle which is empty five points will be deducted.

VII. SOLANO TARGET—MARKS I AND II.

1. **Official Handbook.** — Full directions regarding the Solano Target and landscape targets, together with information as to their use for instruction, are contained in the official handbook —*Standard Equipment for Miniature Ranges* (40, War Office, 2005)—from which the following short extracts are made. One of these handbooks is supplied to units with each Solano Target, and should be kept for reference.

2. **Framework and Mechanism** (Fig. 53).—The Mark I Target consists of a framework containing two tiers 10 feet long—Tier A (higher), and Tier B (lower). Tier A is fitted with crossing target mechanism, operating two target carriers from opposite ends of the Tier, and clips for disappearing targets arranged in two separate sections which can be operated simultaneously or separately. Tier B is fitted with falling target clips, which allow targets to fall when hit. Falling clips can be raised and lowered from the firing-point, like the disappearing clips on Tier A. The former can be shifted to right and left, and the latter linked together with coupling clips to facilitate any desired arrangement of targets or figures. All mechanism can be operated from the firing-point by means of cords labelled to show the particular mechanism they operate (Fig. 54).

3. **Scenery.**—There are two types of scenery—A and C—consisting of backgrounds which will serve to represent foreground, middle distance, and distance of almost any kind of country in any part of the world. The scenery is pasted on frames, and can be placed in position on the target in a moment (Figs. 55 and 56). Patching pieces are provided to repair shot-holes which are not visible from the firing-point to the naked eye.

4. **Scenic Accessories.**—The details of a landscape can be arranged on the target by placing the various scenic accessories, consisting of colour-printed representations of various natural and other features, mounted on stiff card, in any desired position on either tier by fixing them in grooves made for this purpose either behind targets or in front to represent cover. The scenic accessories are coloured and scaled for different ranges, the range being printed on each. They may be used to represent the following features:

Wooded hills.
Flat-topped hills or kopjes.
Conical hills.
Woods.
Fir-wood.
Group of houses with church.
Group of cottages.
House.
Cottage.
Oak-tree.
Elm-tree.
Fir-tree.
Palm-tree.
Hedgerow.
Thick hedge or bush.
Bushes.
Stone wall.
Undergrowth.
Folds of ground.
Low banks.
Indian hill fort.
Sangar.
Rocks.

5. **Solano Figures.**—The Solano figures are all scaled to size for various distances, and consist of the following brown, grey, or colour-printed figures. Each figure is provided with a base equal in depth to the clips which hold them in position.

Reference Number.	Description.	Distance (Yards).
42	Infantryman in kneeling position	200
1	,, ,, standing position	400
2	,, ,, prone position or firing from open trench	400
3	,, firing from behind sand-bag	400
4	,, ,, ,, loophole in head cover ..	400
5	,, in standing position	600
6	,, ,, ,, ,, ...	800
7	,, ,, kneeling position	800
8	,, ,, lying position	800
9	Mounted cavalryman	800
19	Machine-gun in action	800
25	Infantry line in extended order	1,000
26	,, ,, ,, ,, ...	1,200
27	,, ,, ,, ,, ...	1,400
29	Machine-gun in action	1,400
30	Infantry line in extended order	1,600
31	,, ,, ,, ,, ...	1,800
32	Company of infantry in fours	2,000
33	Infantry line in extended order	2,000
34	Field-gun in action	2,000
35	Crossing-targets: Convoy waggon facing firer's right	2,000
35a	Crossing-targets: ,, ,, ,, ,, left	2,000
37	Crossing-targets: Squadron of cavalry facing firer's right ..	2,000
37a	Crossing-targets: ,, ,, ,, ,, left ..	2,000
38	Company of infantry in fours	2,500
39	,, ,, ,, column	2,800

6. **Observation Practices.**—Observation practices may be carried out by heaping a bank of sawdust at the foot of the apparatus below Tier B, with its surface sloping at the same angle as the end-frames. To fix targets in the sawdust, attach to *Observation Practice Holders* consisting of iron pins grooved at the top to hold targets. *Care must be taken to remove all sawdust and grit displaced by bullets from the falling target clips and other mechanism, or their action may be clogged. A brush should be used to clean the mechanism after observation practices.*

7. **Landscape Targets.**—The official handbook above referred to contains information as to fixing landscape targets to the framework of the Solano Target in position for instruction in firing (Fig. 57).

VIII. SOLANO ELEMENTARY AND INSTRUCTIONAL TARGETS.*

1. In *Musketry Regulations*, para. 361, it is laid down that in carrying out training on miniature ranges *due regard must be paid to the visibility of service targets, and bull's-eye targets must be used for the first few rounds only.* In para. 206 (iii) of *Musketry Regulations* (see Sec. 17, para. 4 of this book) focussing the eye on the fore-sight of the rifle instead of on the object is indicated as a common fault which instructors must guard against in elementary stages of training. This error is common when bull's-eye targets are used, and unless remedied will adversely affect shooting at service Targets, on which the eye must be focussed, and which must be watched closely when firing.

2. **Elementary Targets** (Figs. 67 and 68).—The Solano Elementary Targets have been designed to counteract the tendency to focus the eye on the fore-sight instead of on the target, and may be used for grouping and application practices after firing at the bull's-eye target. These targets are coloured green, brown, and grey, instead of white, to accustom the eye to the tints of natural

* The illustrations of these Targets in this section only show the aiming-marks and scoring diagrams. These are printed in the centre of square card surfaces of convenient size in the usual manner, the cards being green, grey, or brown, instead of white.

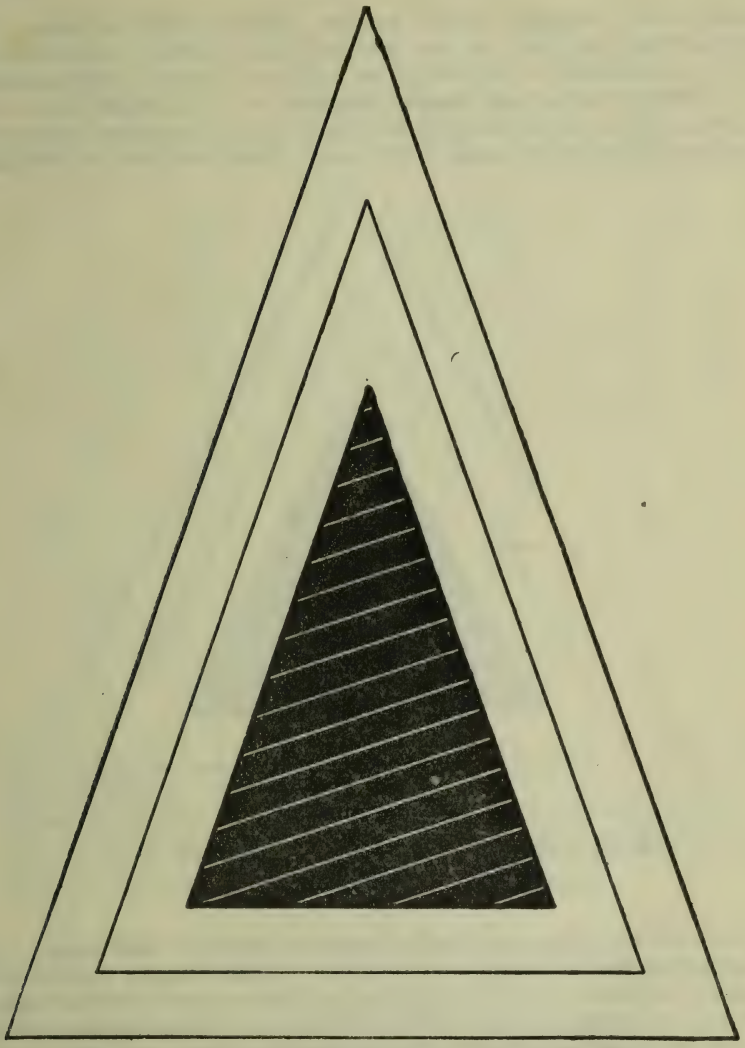


Fig. 67.—SOLANO ELEMENTARY TARGET NO. 1.
(Actual size. See footnote, p. 250.)

backgrounds against which service targets will be seen. The aiming-mark in No. 2 is less distinct than in No. 1, to accustom the eye gradually to focussing on indistinct targets when aiming.

3. **Triangle Aiming and Scoring Diagrams.**—(i) Triangles have been substituted in these targets for concentric circles as aiming and scoring diagrams, because they have a truer relation to the shape

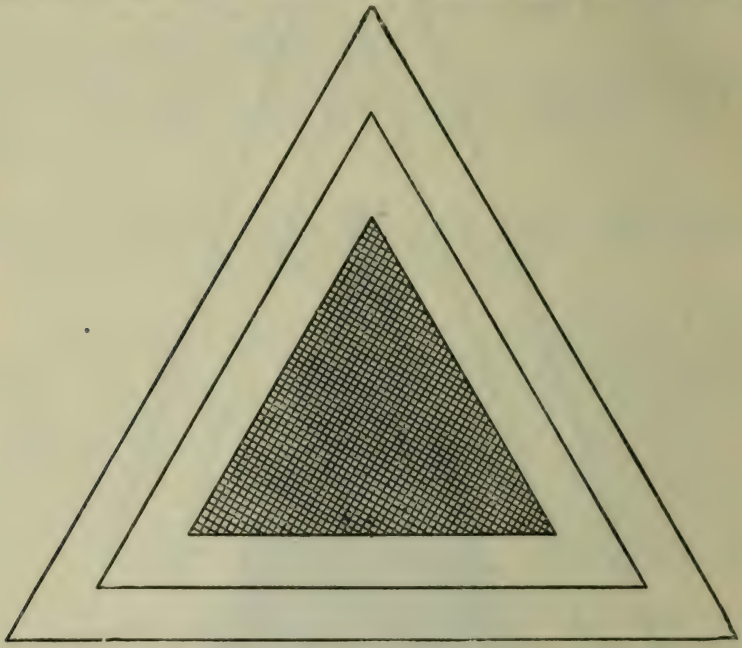


Fig. 68.—SOLANO ELEMENTARY TARGET No. 2.

(Actual size. See footnote, p. 250.)

of the human figure in both lying and upright positions. The triangle on No. 1 target has relation to the human figure in an upright position, and the triangle on No. 2 target to the human figure in a lying position. The *dimensions of the triangles on these targets correspond with the regulation grouping standards of the British Army.*

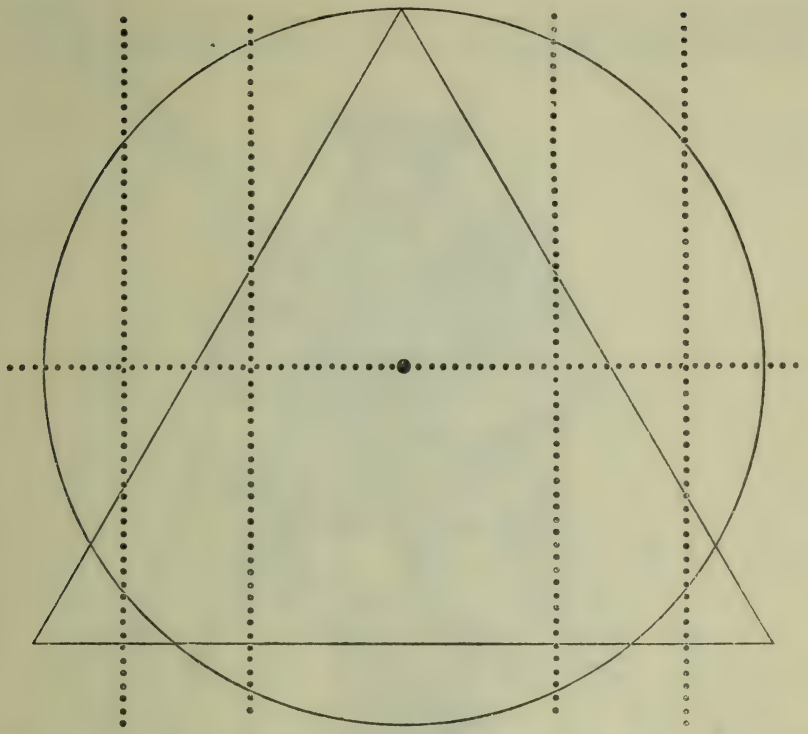


Fig. 69.—A Circle (3 Inches in Diameter) and a Triangle (3 Inches Equilateral) showing that the Triangle as Aiming and Scoring Diagram induces Closer Grouping than the Circle by Allowing Less Margin for Both Vertical and Lateral Errors represented by the Dots.

(ii) For elementary instruction in aiming the important six o'clock line—the centre of the base of the triangle—is on these targets an indicated instead of an imaginary line, as in the case of the circular bull's-eye. More consistent grouping is induced by the triangle owing to the fact that it allows a much narrower

Fig. 70.—SOLANO INSTRUCTIONAL TARGET NO. 1. UPRIGHT FIGURE. 25 YARDS = 400.
(Slightly reduced from actual size. See footnote, p. 250.)

margin for lateral errors, while its conical shape and straight base considerably curtail the scoring area for vertical errors off

Fig. 71.—SOLANO INSTRUCTIONAL TARGET NO. 2. UPRIGHT FIGURE. 25 YARDS = 500.

(Actual size. See footnote, p. 250.)

the six o'clock line as compared with the circle (Fig. 69). The triangle, moreover, as an aiming and scoring surface puts a

premium upon *a low point of aim* and from the first inculcates in men, as a habit, this vital principle of marksmanship in war.

(iii) The centre triangles are not made smaller, firstly, because it is not desired to encourage the habit of slow aim which is engendered by individual practice at very small marks, and which militates against efficiency in snapshooting and rapid firing; and, secondly, because it is not desired to encourage men to attain a useless and disproportionate degree of excellence in firing at

Fig. 72.—SOLANO INSTRUCTIONAL TARGET NO. 3. LYING FIGURE. 25 YARDS=300.

(Actual size. See footnote, p. 250.)

elementary targets which is merely preparatory for practice at service targets.

4. **Instructional Targets** (Figs. 70, 71, and 72).—(i) These targets are also coloured green, grey, and brown, the colour of the uniform of the figures on them corresponding in each case with that of the target. The figures are accurately scaled down to correct size at 25 yards for the actual distances, so as to help men in judging close range by accustoming the eye to the appearance of men seen at different distances against backgrounds which harmonize with the colour of their uniform. It must be

remembered that the figures on these targets, though necessarily depicted in fixed postures as stationary marks, represent men in movement during which they are seldom stationary or seen in a fixed posture, except, possibly, for a few seconds while lying down to fire.

(ii) Accordingly, marks are not given for hits scored on any particular part of the figures depicted in fixed postures, which would usually be seen in movement, but for shots grouped in areas of comparative value as regards probable assurance of fire effect, chosen in the light of experience of war as the best aiming points for firing at figures in movement which frequently and suddenly alternate between the upright and lying positions. The centre triangles, representing the most valuable of these grouping areas, are purposely made fairly large for the reasons stated in connection with the elementary triangles—namely, that they are grouping areas for snapshooting, and not for deliberate firing.

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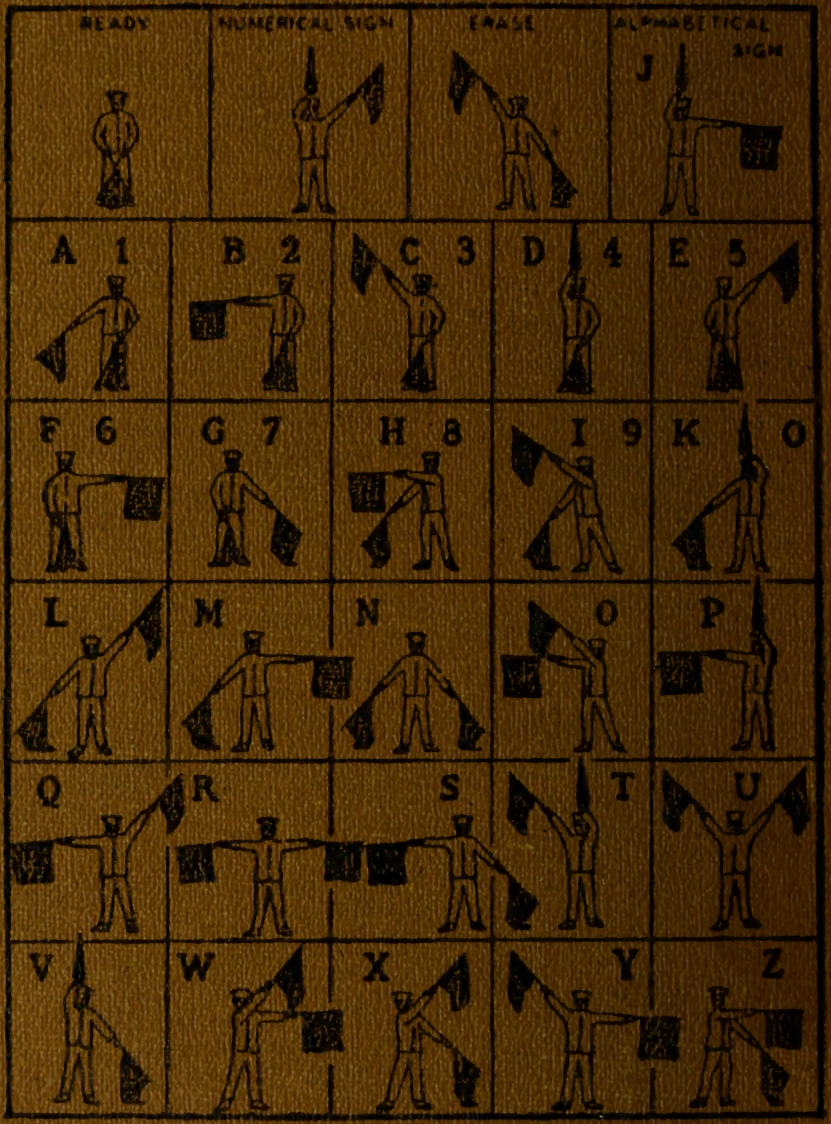
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